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# COMPARABILITY OF NINE METHODS FOR MONITORING $NO_2$ IN AMBIENT AIR

T. D. Hartwell, et al

Research Triangle Institute

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# COMPARABILITY OF NINE METHODS FOR MONITORING $NO_2$ IN AMBIENT AIR

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16. ABSTRACT

The present study was undertaken to compare several $NO_2$ monitoring methods based on field data collected by EPA. Three continuous monitors (Chemiluminescent and two Saltzmans) and six bubblers (two Arsenite, two modifications of the Jacobs Hochheiser, and two Triethanolamine methods were investigated.

In particular, objectives of the project were (a) to determine the comparability of these nine methods using field measurements obtained in Chattanooga, Los Angeles, and St. Louis and (b) to determine, if possible, conversion factors for converting readings from one method to another. The criteria used in attempting to satisfy these objectives involved examining statistics such as correlations between methods, ratios of method means, and regression relationships between pairs of methods.

The present study dealt only with the analysis of field data, which imposed several limitations on the inferences that could be drawn from the analysis. For example, the bias of the various methods was indeterminable; also, no data on potential $NO_2$ measurement interferences was available.

The results of the study indicate that additional laboratory and field work is necessary on a subset of the nine methods studied before a decision can be made as to which $NO_2$ monitoring method should be used in the field. RTI would suggest that the subset include four methods: one Arsenite, one Triethanolamine, one Saltzman and the Chemiluminescent. The two modifications of the Jacobs Hochheiser method should be dropped from consideration

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## FOREWORD

This report presents RTI's analysis of $NO_2$ data from nine monitoring methods collected by EPA from July 1, 1972 through April 30, 1973. Appendix H gives a listing of the daily data given to RTI by EPA by site, day and monitoring method. The reader who is only interested in a brief summary of RTI's analysis is referred to Section 5.

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# 1. INTRODUCTION AND OBJECTIVES

The 1967 Amendments to the Clean Air Act required the Secretary of the Department of Health, Education, and Welfare (HEW) to develop and publish air quality criteria which, in his opinion, were necessary to protect the public health and welfare. The 1970 Amendments to the Clean Air Act required the Administrator of the Environmental Protection Agency (EPA) to promulgate National Ambient Air Quality Standards for those pollutants for which air quality criteria documents had been or would be published. The "Air Quality Criteria for Nitrogen Oxides" was published in January, 1971. On April 30, 1971, William D. Ruckelshaus, Administrator of EPA, promulgated in the Federal Register the "National Ambient Air Quality Standards" for six pollutants, including $NO_2$, as well as the reference measurement method (herein called the Federal Reference Method) to be used to measure these pollutants. The Reference Method published for the measurement of $NO_2$ in ambient air to determine compliance with national air quality standards was the National Air Surveillance Network's modification of the Jacobs-Hochheiser method [6].

During the period April 1971 to July 1972 several studies were conducted which indicated that the Reference Method for measuring $NO_2$ in ambient air possessed deficiencies. These reports, published by EPA and other independent groups, raised questions as to the accuracy and validity of $NO_2$ data collected over the past decade. In particular, the validity of data collected during the Chattanooga Health Effects Study [23], on which the National Air Quality Standard for $NO_2$ is based, was questioned [12]. The main objections to the Federal Reference Method were its low and variable collection efficiency and the interference of nitric oxide on the measurement. As a result of these studies, the Administrator of EPA deferred implementation of regulations regarding control of $NO_2$ from certain stationary sources from July 31, 1972 to July 1, 1973. During this period of time, studies were to be undertaken by EPA to reevaluate the analytical procedures of the Reference Method and to develop acceptable modifications to the Reference Method (i.e., improved collection efficiency and precision, and elimination of interference of nitric oxide) or a substitute reference method to be used for compliance monitoring. These studies include a methods comparability program conducted by EPA in Chattanooga, St. Louis, and Los Angeles which is the subject of this report. The data for the comparability study were collected by EPA and the analysis of the data was carried out by the Research Triangle Institute (RTI).

In particular, the objectives of this study were: (a) to determine the comparability of nine methods for monitoring $NO_2$ in ambient air, using field measurements obtained during the period July 1972 through April 1973 in Chattanooga, Los Angeles, and St. Louis; (b) to determine, if possible, conversion factors for converting readings from one method to another. The criteria used in attempting to satisfy these objectives involved examining sample statistics such as correlations between methods, ratios of method means, frequency distributions of methods, regression relationships between pairs of methods, standard deviations of methods and comparison of duplicate readings by each method. The nine monitoring methods were as follows:

1. Chattanooga Health Effects Study Method,
2. Federal Reference Method,
3. Arsenite (straight tube impinger),
4. Arsenite (fritted bubbler),
5. Triethanolamine (TEA) (fritted bubbler),
6. Triethanolamine-Guaiacol-Sulfite (TGS) (straight tube impinger),
7. Continuous Saltzman (Technicon-Chattanooga study),
8. Continuous Saltzman (Technicon Mark IV), and
9. Chemiluminescent.

Detailed descriptions of these methods are given in Section 3.

It should be emphasized that this study dealt only with the analysis of field data, which generally imposes several limitations on the types of analyses that can be performed. One major limitation, for instance, was that the bias of the various methods was indeterminable. That is, since the true concentration of $NO_2$ in the air was unknown, it was impossible to determine which method provided values closest to the true level. Another limitation of the current study was that data on (potential) $NO_2$ measurement interferences, such as NO and ozone, were not available to RTI. Hence, no evaluation of, or adjustment for, these interferences could be made in the analysis and comparison of $NO_2$ monitoring methods. Sections 4.2 and 5.4 indicate some other limitations that should be considered when examining the results of this study. In fact, because of the many limitations of the field data analyzed in this report, RTI does not recommend that the functional relationships between monitoring methods developed in this report be used in general for describing the relationship between pairs of methods. The relationships given here do give an indication of how the various methods relate to one another; but indiscriminate use of these relationships (e.g., converting $NO_2$ measurements from one method to another at any site in the United States) is not recommended.

In this report, Section 2 presents a literature review, Section 3 gives brief descriptions of the nine monitoring methods under study, Section 4 describes RTI's analysis of the monitoring data, and Section 5 presents a summary of the results.

It should be mentioned here that besides the study described in this report, EPA has many other ongoing programs having to do with the methods used in ambient $NO_2$ measurements. For example, the Methods Standardization Branch (MSB) of the Quality Assurance and Environmental Monitoring Laboratory is attempting to standardize a number of $NO_2$ methods. This standardization process starts with an in-depth examination of a candidate method in a single laboratory to try to detect obvious weakness or pitfalls that should be dealt with. In carrying out this examination the "Ruggedness Testing" type of experimental design as proposed by Youden [26] is used. Once it is decided that the method is viable, it is then submitted to interlaboratory collaborative testing in which several laboratories use the same method on the same material so that it can be determined how the method can be expected to perform in the hands of typical users. The collaborative testing is designed to allow EPA to develop important statistics such as repeatability, reproducibility and method bias. At the present time MSB is applying the standardization process to four $NO_2$ methods: the Arsenite, TGS, continuous Saltzman and Chemiluminescent.

Another important program in $NO_2$ measurement investigation is being carried out in the Field Monitoring and Instrument Evaluation Branch (FMIEB) of the Quality Assurance and Environmental Monitoring Laboratory. (The field work for this study has been completed, but the data analysis and report have not yet been done.) In brief, FMIEB set up facilities in the CAMIO Station in Durham to make simultaneous $NO_2$ measurements, in duplicate, from ambient air and from ambient air with added $NO_2$. Four different procedures were used: the Arsenite and TGS procedures resulting from the MSB single laboratory evaluation, and the continuous Saltzman and Chemiluminescent procedures, which were carefully set up by internal EPA experts in close coordination with the manufacturers' representatives. Measurements were made in 24-hour increments so that all four methods could be intercompared. There were three phases to this program. The first phase consisted of taking $NO_2$ measurements of ambient air as it was delivered by the atmosphere as well as measurements taken on ambient air to which $NO_2$ was added at a constant rate over the 24-hour sampling period. The second phase involved measurements of higher levels of $NO_2$ added to $NO_2$-free air in one to four hour increments during the 24-hour sampling period. The third phase was designed to study the effect of ozone as an interferent.

## 2. LITERATURE REVIEW

Until recently, the only methods available for monitoring nitrogen dioxide ($NO_2$) in ambient air were based on classic colorimetric procedures (i.e. Jacobs-Hochheiser and Saltzman methods). The National Air Surveillance Network's (NASN) modification of the Jacobs-Hochheiser method [6] was published as the Reference Method for monitoring $NO_2$ in ambient air in the Federal Register, April 30, 1971, edition "National Primary and Secondary Ambient Air Quality Standards." Nitrogen dioxide data used to set national primary and secondary ambient air quality standards for $NO_2$ ($100\ \mu g/m^3$ -- annual arithmetic mean) were obtained during the Chattanooga Health Effects Study [23] using a variation of the Jacobs-Hochheiser procedure not consistent with the method published in the Federal Register. Here, two straight tube impingers were used in series instead of a fritted bubbler as the collection device for the 24-hour integrated samples. In order to avoid confusion, the following terminology will be used for identification of variations of the Jacobs-Hochheiser procedure: (1) Federal Reference Method (NASN modification) and (2) Chattanooga Health Effects Study Method (CHESS modification).

The main objection to the methods based on the Jacobs-Hochheiser procedure is the low and variable collection efficiency which directly affects the accuracy of the measurement. The $NO_2$ collection efficiency has been studied by several investigators and appears to be dependent upon the conditions of the experiment.

Jacobs and Hochheiser [14] reported $NO_2$ recoveries of approximately 90 percent using their original procedure. Morgan, Golden, and Tabor [19] found the collection efficiency of the Reference Method to vary from 42 to 65 percent with an overall average of 53 percent at their recommended conditions. The collection efficiency determinations in these studies ([14] and [19]) did not use permeation tubes to generate $NO_2$ concentrations. Shy, et al. [23] determined an "empirical sampling factor" of 0.695 for the Chattanooga Health Effects Study Method, using a $NO_2$ permeation tube calibration system and two straight-tube impingers in series as the sampling apparatus. "Corrected" $NO_2$ values were then calculated by dividing observed $NO_2$ concentrations by the empirical sampling factor (0.695) obtained with $NO_2$ concentrations approximating ambient levels [23]. Purdue, Dudley, Clements, and Thompson [20] in a recent reinvestigation of the Federal Reference Method reported an average overall collection efficiency of 35 percent with a standard deviation of about 15 percent. The DHER[1] "empirical sampling factor" of 0.695 agrees quite well with the NASN correction factor for collection efficiency of 0.35 when the 2 of the numerator of the equation used to relate $NO_2$ gas concentration to nitrite ion formation is taken into account:

$$2NO_2 + 2NaOH \rightarrow NaNO_2 + NaNO_3 + H_2O$$

$$\text{ppm } NO_2 = 2 \times \frac{\mu g\ NO_2^-}{0.695 \times m^3} \times 5.32 \times 10^{-4}$$

Blacker and Brief [3] reported collection efficiencies ranging from 35 percent at 0.215 ppm $NO_2$ to 65 percent at 0.05 ppm $NO_2$ using a fritted bubbler collection device and permeation tubes to generate $NO_2$ concentrations. An average collection efficiency of 73.7 percent was determined in their study using two collection devices in series. In a recent article by Hauser and Shy [11], data were presented showing that the collection efficiency of the Federal reference method varies nonlinearly with $NO_2$ concentration from 15 percent at 740 $\mu g\ NO_2/m^3$ to 50-70 percent at 20-50 $\mu g\ NO_2/m^3$.

---

[1] Division of Health Effects Research

The Federal Reference Method calculation for $NO_2$ concentration, as published [6], includes an overall efficiency correction of 35 percent. The studies cited above indicate that at concentrations of $NO_2$ in ambient air (30 to 60 $\mu g/m^3$), where collection efficiencies are much higher than 35 percent, the reported concentration will be much higher than the actual ambient levels. At ambient $NO_2$ levels on the order of 120 $\mu g/m^3$, a 35 percent correction factor will be valid. At levels above 130 $\mu g/m^3$, the use of a 35 percent correction factor will underestimate the actual $NO_2$ concentration.

Another objection to the Federal Reference Method is that nitric oxide (NO) is an interferent with the measurement of $NO_2$. Heuss, Nebel, and Colucci [12] reported a relative response to NO of approximately 25 percent. Hauser and Shy [11] reported that at a $NO/NO_2$ ratio of 1.0 or less there is little effect of NO on the overall efficiency of the method; however, at higher $NO/NO_2$ ratios the overall efficiency is considerably higher due to NO interference.

The validity of data collected in previous years, especially for low ambient air $NO_2$ concentrations (i.e., $< 0.05$ ppm), and the data used to set the $NO_2$ standard are questionable. One approach for adjustment of past data would be to apply a correction factor to these data. To do this, it would be necessary to demonstrate a consistent relationship between the current Reference Method and other analytical techniques. One objective of the present study is to determine the interrelationship between the nine methods currently being evaluated.

Several modifications to the Reference Method have been made to improve the collection efficiency and to eliminate the interference of NO. A recent study by Christie, Lidzey, and Radford [4] has shown that the $NO_2$ collection efficiency can be raised from 35 to 95 percent by the addition of sodium arsenite to the absorbing reagent. Two of the six 24-hour methods incorporated into the present methods comparability study are based on the arsenite method (i.e., arsenite-orifice and arsenite-frit). Levaggi, Siu, and Feldstein [17] report that $NO_2$ absorption efficiencies of over 95 percent are attained using a solution of triethanolamine as the absorbing reagent with no interference from NO up to 0.6 ppm. A variation of this method which is included in the present study is the TEA-frit. Sawicki, _et al._ [22] have incorporated in their method a combination of triethanolamine, guaiacol, and sodium metabisulfite as the absorbing reagent. Collection efficiencies greater than 92 percent were attainable with no interference from the following species: NO, $SO_2$ $CO_2$, etc. This method was incorporated into the present methods comparability study on September 21, 1972 as the TGS-orifice method.

The Saltzman method [5] for monitoring $NO_2$ in ambient air is also a colorimetric procedure employing a slightly different reagent system. Continuous recording of $NO_2$ concentration is possible; however, maintenance requirements and reagent costs are excessive, and instrument zero and span stability are less than desirable.

During the past two years, instrumentation based on the chemiluminescent principle has become available for monitoring NO and $NO_2$. Two techniques based on the specific chemiluminescent reaction between NO and ozone at low pressure and at atmospheric pressure have been developed. Recently, atmospheric pressure chemiluminescent NO-$NO_x$-$NO_2$ analyzers have been installed in Chattanooga, Los Angeles, and St. Louis. Results from an instrument evaluation program conducted in St. Louis [5], where measurements from a modified low pressure chemiluminescent NO-$NO_x$ analyzer were compared to measurements obtained using the Federal Reference Method indicated better than 92 percent absolute agreement between the two methods (i.e., the Federal Reference Method was within 92 percent of the chemiluminescent analyzer) for concentrations of $NO_2$ less than 0.10 ppm.

# 3. DESCRIPTION OF METHODS

## 3.1 Introduction

Brief descriptions of the measurement methods employed in the comparability study conducted in Los Angeles, St. Louis, and Chattanooga are presented in this section. Since the analytical procedure for six of the manual measurement methods (i.e., Federal Reference Method, Chattanooga Health Effects Study Method, Arsenite Method (Orifice), Arsenite Method (Frit), TEA Method (Frit), and TGS Method (Orifice)) compared in this study are similar, complete descriptions of the analytical or sampling section will not be included for each method. Unless so indicated, the procedures described for the Federal Reference Method will suffice for each method.

In the remainder of this report the following abbreviations will be used to denote the various methods:

(1) Federal Reference Method = FRMF
(2) Chattanooga Health Effects Study Method = CHESSO
(3) Arsenite Method (straight tube impinger) = CHRO
(4) Arsenite Method (fritted bubbler) = CHRF
(5) Triethanolamine (fritted bubbler) = TEAF
(6) Triethanolamine-Guaiacol-Sulfite[1] (straight tube impinger) = TGSO
(7) Continuous Saltzman (Chattanooga) = TECH
(8) Continuous Saltzman (Technicon Mark IV) = TEC4
(9) Chemiluminescent = CHEM

---

[1] Sampling on the TGSO method did not begin until September 21, 1972.

## 3.2 Federal Reference Method, FRMF (NASN Modification of Jacobs-Hochheiser Procedure) [6]

### a. General Description

Nitrogen dioxide is collected by bubbling air through a 0.1N solution of sodium hydroxide to form a stable solution of sodium nitrite. The nitrite ion produced during sampling is then determined colorimetrically by reacting the exposed absorbing reagent with phosphoric acid, sulfanilamide, and N-1-naphthylethylenediamine dihydrochloride. This method is applicable to collection of 24-hour samples in the field with subsequent analysis in the laboratory. The range of the method is claimed to be 20-740 μg/m$^3$ (0.01-0.4 ppm) nitrogen dioxide for a 24-hour sampling interval at a sample flow rate of 200 cc/minute. An overall collection efficiency of 35 percent was obtained from test atmosphere having nitrogen dioxide concentrations of 140 μg/m$^3$ and 200 μg/m$^3$ by automated analysis [20]. For the present study a collection efficiency of 35% was assumed for the FRMF.

### b. Sampling Procedure

The samples for $NO_2$ (one for each 24-hour interval) are collected in an absorber consisting of a polypropylene centrifuge tube, a two-hole polypropylene stopper, and a bubbling apparatus (frit with porosity in the range of 70-100 μ). These collection devices containing 50 mℓ of absorbing reagent are sent to the field along with calibrated limiting orifices (27 guage 3/8" hypodermic needle) which produce a flow rate of

175-230 cc/min. A membrane filter and trap containing glass wool are connected between the bubbler and orifice to prevent or reduce plugging of the orifice by entrained absorbing reagent. Collected samples are returned to the laboratory for subsequent analysis.

### c. Analytical Procedure

An automated system (Technicon Autoanalyzer) is used for analysis of $NO_2$ samples received from the field. Samples are placed on a sample turntable and automatically picked up at a rate of 40 samples per hour. Appropriate reagents are mixed with the samples, which then flow through time delay coils to the colorimeter, where the absorbance of the azo dye produced in the reaction is read at 558 nm and displayed on a stripchart recorder. Approximately 8 minutes elapse between sample pickup and appearance of the corresponding peak on the recorder chart. Standardization of the autoanalyzer is accomplished with liquid nitrite standard solutions.

## 3.3 Chattanooga Health Effects Study Method, CHESSO [23]

### a. General Description

Nitrogen dioxide is collected by bubbling air through a 0.1N solution of sodium hydroxide forming a stable solution of sodium nitrite, which, when reacted with phosphoric acid, sulfanilamide, and N-1-naphthylethylenediamine dihydrochloride, forms an azo dye. The absorption of the azo dye is then determined colorimetrically at 558 nm. An "empirical sampling factor" of 0.695 was determined experimentally for this method and used to calculate corrected $NO_2$ values [23].

### b. Sampling Procedure

Integrated samples (one each 24-hour period) are collected in two absorbers connected in series, each containing an orifice tube (1 mm diameter) instead of a frit and 35 mℓ of absorbing reagent. A sample flowrate of approximately 500 cc/min is maintained using hypodermic needles as critical orifices. A membrane filter and trap containing glass wool are connected between the bubbler and orifice to prevent or reduce plugging of the orifice by entrained absorbing reagent. Collected samples are returned to the laboratory for analysis.

### c. Analytical Procedure

An automated system (Technicon Autoanalyzer) is used for analysis of all field samples. The analysis procedure is essentially the same as that described for the Federal Reference Method.

## 3.4 Arsenite Method (Orifice), CHRO [15]

### a. General Description

Nitrogen dioxide is collected by bubbling ambient air through a 0.1N sodium hydroxide solution containing 0.1 percent sodium arsenite to form a stable solution of sodium nitrite. The nitrite ion produced during sampling is then determined colorimetrically at 558 nm by reacting the exposed absorbing reagent with phosphoric acid, sulfanilamide, and N-1-naphthylethylenediamine dihydrochloride to form an azo dye. An overall collection efficiency of 85 to 95 percent has been reported for this method with a slight interference by nitric oxide at high concentrations. In the present study a collection efficiency of 85 percent was used.

### b. Sampling Procedure

Integrated samples (one each 24-hour period) are collected in a collection unit, a polypropylene tube fitted with a two-hole polypropylene stopper and containing a bubbling apparatus which consists of an orifice (1 mm diameter) tube at a flow rate of 175-230 cc/min. Appropriate filters and traps are included to prevent plugging of the hypodermic needle critical orifice by entrained absorbing reagent.

### c. Analytical Procedure

Analyses of field samples are accomplished on a Technicon Autoanalyzer modified for continuous, automated analysis of $NO_2$ samples.

## 3.5 Arsenite Method (Frit), CHRF [15]

### a. General Description

See Section 3.4.a. (CHRO) for a general description.

### b, Sampling Procedure

Integrated samples (one each 24-hour period) are collected in a collection unit, a polypropylene tube fitted with a two hole polypropylene stopper and containing a bubbling apparatus which consists of an upturned frit with porosity range of 70-100 μ at a flowrate of 175-230 cc/min. Appropriate filters and traps are included to prevent plugging of the hypodermic needle critical orifice by entrained absorbing reagent.

### c. Analytical Procedure

The procedure is the same as for CHRO, Section 3.4.c.

## 3.6 Triethanolamine Method (Frit), TEAF [15]

### a. General Description

The method is the same as for CHRF, Section 3.4.a., except that nitrogen dioxide is collected by bubbling air through 0.1 M triethanolamine solution to form a dilute solution of sodium nitrite.

### b. Sampling Procedure

Integrated samples (one each 24-hour period) are collected in a collection unit, a polypropylene tube fitted with a two-hole polypropylene stopper and containing a bubbling apparatus which consists of an upturned frit with porosity range of 70-100 μ at a flow rate of 175-230 cc/min. Fifty ml of 0.1 M triethanolamine are used as the absorbing reagent. Appropriate filters and traps are included to prevent plugging of the critical orifice by entrained absorbing reagent.

### c. Analytical Procedure

The procedure is the same as for CHRO, Section 3.4 c.

### 3.7 Triethanolamine-Guaiacol-Sulfite Method, (Orifice) TGSO [15]

a. General Description

The method is the same as for CHRO, Section 3.4.a., except that nitrogen dioxide is collected by bubbling ambient air through an absorbing reagent containing triethanolamine, guaiacol (o-methoxy-phenol), and sodium metabisulfite. A collection efficiency of over 92 percent $NO_2$ has been reported in the form of nitrite ion in the range 20 μg $NO_2/m^3$ to 740 μg $NO_2/m^3$. No interference has been found from NO, $SO_2$, $O_3$, CO, $CO_2$, HCOH, $NH_3$, and phenol. In the present study the collection efficiency used was 100% for the TGSO.

b. Sampling Procedure

The procedure is the same as for CHRO, Section 3.4.b.

c. Analytical Procedure

See Section 3.4.c.[1]

### 3.8 Continuous Saltzman (Chattanooga), TECH [13]

a. General Description

Measurement of the concentration of nitrogen dioxide in ambient air via a Technicon II Air Monitor is based on the absorption of $NO_2$ in a Greiss-Saltzman reagent [21] that produces a red dye whose absorbance can be determined by a recording colorimeter at 560 nm. This involves diazotization of sulfanilic acid by nitrous acid derived from $NO_2$ followed by a coupling reaction with N-1-naphyhylethylenediamine dihydrochloride to form the dye. Negligible interferences are reported for this method. A logarithmic output is obtained from the colorimeter.

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[1] Note that the TGSO method used in the present study has been subsequently modified.

### b, Sampling Procedure

Ambient air is pulled through an absorption column at approximately 780 cc/min and contacted with Saltzman reagent to form nitrous acid by reaction of nitrogen dioxide with absorbing reagent. The diazotization and coupling reactions are then completed in approximately 25 minutes. Response time to 95 percent for the Autoanalyzer is approximately 25 minutes.

### c, Analytical Procedure

Continuous recording of the $NO_2$ concentration in the atmosphere requires only reduction of data from strip-chart recorder and periodic calibration of the Technicon Autoanalyzer using static or dynamic methods. Dynamic calibration procedures are preferred, since this method of calibration evaluates the entire system (i.e., collection efficiency of absorber and the colorimeter) rather than just the calibration of the colorimeter.

## 3.9 Continuous Saltzman (Technicon Mark IV), TEC4 [13]

### a. General Description

Measurement of the concentration of nitrogen dioxide in ambient air via a Technicon Mark IV Air Monitor is based on the absorption of $NO_2$ in a Greiss-Saltzman reagent [21] that produces a red dye whose absorbance can be determined by a recording colorimeter at 560 nm.

This involves diazotization of sulfanilic acid by nitrous acid derived from $NO_2$ followed by a coupling reaction with N-1-naphyhylethylenediamine dihydrochloride to form the dye. Negligible interferences are reported for this method. A linear output is obtained from the colorimeter.

### b. Sampling Procedure

Ambient air is pulled through an absorption column at approximately 420 cc/min and contacted with Saltzman reagent to form nitrous acid by reaction of nitrogen dioxide with absorbing reagent. The diazotization and coupling reactions are then completed in approximately 15 minutes. Response time to 95 percent for the autoanalyzer is approximately 15 minutes.

### c. Analytical Procedure

Continuous recording of the $NO_2$ concentration in the atmosphere requires only reduction of data from a strip-chart recorder and periodic calibration of the Technicon Autoanalyzer using static or dynamic methods. Dynamic calibration procedures are preferred.

## 3.10 Chemiluminescent Method, CHEM

### a. General Description

The principle of operation of the Bendix $NO\text{-}NO_x\text{-}NO_2$ analyzer is based on the specific, chemiluminescent gas phase reaction of NO and ozone occurring at atmospheric pressure. Light emission from the reaction

$$NO + O_3 \rightarrow NO_2^* + O_2 \rightarrow NO_2 + h\nu$$

is proportional to the concentration of NO in the sample stream. Nitrogen dioxide in the sample stream is catalytically converted to NO via a heated gold wool filter maintained at 220°C. Nitric oxide passes unchanged through the catalytic converter and an $NO_x$ measurement (i.e., NO + $NO_2$ reduced to NO) is made. The $NO_2$ concentration is obtained by substracting the NO output from the $NO_x$ output. The effective range of the analyzer is from 0.005 to 5 ppm with a minimum detectable concentration of approximately 0.005 ppm. Lag time, response time, and total time for response to 95 percent are reported to be 5, 20, and 25 seconds, respectively. No compounds normally encountered in ambient air have been reported to interfere with this measurement method.

### b. Sampling Procedure

Ambient air is pulled through a teflon filter into the analyzer at 200 cc/min and mixed with ozone, producing a chemiluminescent reaction. The light emission is detected via a photomultiplier tube and the NO, $NO_x$, and $NO_2$ concentrations are displayed on strip-chart recorders.

### c. Analytical Procedure

No specific analytical procedures other than periodic, dynamic calibration of the analyzer are required.

Table 3.1 provides a brief summary of the methods described above.

Table 3.1

$NO_2$ Monitoring Methods

| Method Name | Notation | Assumed Collection Efficiency | Comments |
|---|---|---|---|
| 1. Federal Reference Method | FRMF | 35% | Bubbler, daily readings |
| 2. Triethanolamine Method (Fritted Bubbler) | TEAF | 100% | Bubbler, daily readings |
| 3. Arsenite Method (Fritted Bubbler) | CHRF | 85% | Bubbler, daily readings |
| 4. Arsenite Method (Straight Tube Impinger) | CHRO | 85% | Bubbler, daily readings |
| 5. Chattanooga Health Effects Study Method | CHESSO | 35% | Bubbler, daily readings |
| 6. Triethanolamine-Guaiacol-Sulfite Method (Straight Tube Impinger) | TGSO | 100% | Bubbler, daily readings, sampling began in September, 1972 |
| 7. Continuous Saltzman (II) (Chattanooga) | TECH | | Used in Chattanooga only; hourly strip chart readings are averaged over time period corresponding to bubbler operation to obtain "daily" values |
| 8. Continuous Saltzman (Technicon Mark IV) | TEC4 | | 5-minute readouts or hourly strip charts are averaged over time period corresponding to bubbler operation to obtain "daily" values |
| 9. Chemiluminescent | CHEM | | Same as TEC4 comment |

# 4. ANALYSIS OF SAMPLING DATA

## 4.1 Introduction

Two sets of data were available to RTI: one containing information on a daily basis for nine monitoring methods and the other, information on an hourly basis for the three continuous monitors (TECH, TEC4 and CHEM). The contents, scope, and method of construction of the daily and hourly data are described in Section 4.2. Data listings of the daily data are given in Appendix H of this report.

Due to the fact that hourly data were available only for the three continuous monitoring methods, the analysis of the sampling data is mainly concerned with the daily data. Statistical editing procedures for the daily data are described in Section 4.3. The analytical criteria and methods for analyzing the $NO_2$ data were developed in earlier phases of the project. Section 4.4 presents the results of the analyses of the daily data. RTI's analysis of the hourly data is given in Section 4.5.

## 4.2 Data Description

The $NO_2$ sampling data gathered by EPA for the purpose of method comparison consists of measurements by several $NO_2$ monitoring methods (see Section 3 for a description of these methods) at sixteen stations in three cities (Chattanooga, St. Louis, and Los Angeles vicinity). However, of these 16 stations only seven contain more than two monitoring methods. Accordingly, for the present report RTI examined data only from these seven stations. The locations of these stations are given in Table 4.1.

The data as collected by EPA are in three different forms:

(a) 24-hour integrated readings[1/] (for the bubbler methods, i.e., FRMF, CHESSO, CHRO, CHRF, TEAF, and TGSO),

(b) 5 minute readings (for methods TEC4 and CHEM), and

(c) 1 hour strip chart readings (for all the continuous methods, i.e., TECH, TEC4, and CHEM).

These data are edited by EPA and then sent to RTI on computer tape in the following forms:

(a) 24-hour readings for all 9 comparison methods[2/],

(b) 1 hour averages derived from the 5 minute readings (for TEC4 and CHEM), and

(c) 1 hour strip chart readings (for TECH, TEC4, and CHEM).

Type (c) is used to supplement the data from the automated data acquisition system (Type (b)). These latter data are referred to as "data set" values.

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[1/] These readings, referred to as "daily" or "24-hour" readings, actually are only approximately of 24-hour duration.

[2/] For the continuous methods, the "daily" readings are obtained by averaging over a time period compatible with that of the bubblers.

Table 4.1

City and Site Codes

| Code | Location |
|---|---|
| Chattanooga (6) | |
| 632 | Briarwood Drive (Hamilton County) |
| 633 | Hickory Valley Road (Hamilton County) |
| St. Louis (9) | |
| 901 | South 12th Street (St. Louis County) |
| 902 | South Hampton Street (St. Louis County) |
| California (8) (Los Angeles vicinity) | |
| 831 | Anaheim |
| 832 | Garden Grove |
| 841 | Glendora |

In summary, the following table indicates the types of data that RTI receives from EPA for each monitoring method:

| | Method[1/] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reading | FRMF | TEAF | CHRF | TGSO | CHRO | CHESSO | TECH | TEC4 | CHEM |
| Daily | I | I | I | I | I | I | S.C. | D.S. | D.S. |
| Hourly | | | | | | | S.C. | D.S. | D.S. |

[1/] I = 24-hour integrated reading
S.C. = strip chart (average)
D.S. = data set (average), supplemented with strip chart data.

Table 4.2 gives the number of daily readings (unpaired) by station (site) and method that RTI has received from EPA for the seven stations where more than two monitoring methods were present. In particular, the table shows that there are nine methods at the two Chattanooga stations and eight methods at the two St. Louis stations and the three California stations (Los Angeles vicinity). (Note that the TECH is only used in Chattanooga.) In addition, in site 832 there are duplicate measurements (denoted by 832D) for the eight methods present in California. The

## Table 4.2

### Number of Daily Measurements by Method and Site Before Removing Outliers--Sampling Period July 1, 1972, - April 30, 1973, Unpaired Data[1]

| | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSO | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| CHATT. | | | | | | | | | |
| 632 | 223 | 228 | 225 | 231 | 251 | 114 | 164 | 183 | 190 |
| 633 | 234 | 230 | 231 | 232 | 246 | 112 | 164 | 180 | 196 |
| St. Louis | | | | | | | | | |
| 901 | 245 | 246 | 245 | 242 | 208 | 123 | * | 28 | 46 |
| 902 | 244 | 242 | 244 | 243 | 204 | 118 | * | 85 | 102 |
| Calif. | | | | | | | | | |
| 831[2] | 56 | 54 | 57 | 55 | 143 | 11 | * | 26 | 45 |
| 832 | 203 | 186 | 219 | 195 | 234 | 105 | * | 143 | 135 |
| 841 | 210 | 191 | 210 | 203 | 204 | 103 | * | 107 | 121 |
| 832D[2] | 143 | 140 | 158 | 145 | 153 | 84 | * | 69 | 66 |
| TOTAL | 1558 | 1517 | 1589 | 1546 | 1643 | 770 | 328 | 821 | 901 |

* = method not present.

[1] Total number of sampling days varies for each method (see Table 4.3)

[2] On October 6, 1972, all methods except CHESSO and CHEM were moved from site 831 to site 832 to provide duplicate readings in site 832. These are denoted by 832D.

duplicate measurements were obtained by moving several methods from site 831 to site 832 during October, 1972. (Thus, after October, 1972, site 831 only has measurements by the CHESSO and CHEM methods.) Table 4.3 presents the number of days for which daily readings were obtained for each sampling method over the seven sites. The potential number of sampling days in the table varies for each method since each of the nine monitoring methods did not begin or end sampling on the same day. In examining Table 4.3 the reader should take particular note of footnote 3.

Before RTI received the daily $NO_2$ monitoring data, EPA validated this data. Appendix G gives EPA references which describe how this validation procedure was carried out. Appendix G also gives references to the calibration procedures used by EPA for the various $NO_2$ monitoring methods. In addition to validating the data, EPA also used the following rule in averaging the $NO_2$ data from the continuous monitors (i.e., CHEM, TECH and TEC4):

> In passing from one averaging time to a longer averaging time, 75 percent of the data were required. For example, if an "hourly" average was to be computed from five-minute readings, then at least 9 of the 12 readings were to be available. Similarly, 18 of 24 hourly averages were required to obtain a "24-hour" average.

## Table 4.3

## Number of Days for which Daily Readings were Obtained by Method, Over Sites--Sampling Period July 1, 1972 - April 30, 1973

| | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSO | TECH[2] | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| Potential[1] Sampling Days | 1797 | 1797 | 1797 | 1797 | 2079 | 931 | 417 | 1400 | 1612 |
| Days Where[3] Data Present | 1558 | 1517 | 1589 | 1546 | 1643 | 770 | 328 | 821 | 901 |

[1] Potential sampling days = last day data given to RTI - first day data given to RTI + 1

[2] TECH only used in Chattanooga

[3] The time limitations on the study gave little opportunity to become familiar with the continuous monitoring equipment and the data acquisition system; hence what is seen here may not represent an accurate picture of what might be expected in general or in the future.

The procedure used by EPA to obtain the daily and hourly data set and strip chart readings for the TECH, TEC4, and CHEM methods is summarized in Table 4.4.

Because EPA personnel have indicated that they would like to see some summary statistics before RTI removed outliers from the daily data, Appendix B (Tables B-1 through B-4) gives means, correlations and ratios by site and over sites for the daily data as received by RTI. The remainder of this report then deals with the daily data after RTI removed outliers. Section 4.3 describes how these outliers were removed.

### 4.3 Data Screening for the Daily Data[1]

For the daily data, RTI employed a three-stage screening procedure to deal with outlying $NO_2$ readings. First, a listing of daily data which failed to satisfy a simple mean criterion (see below) was obtained. Those readings in violation of the mean criterion were visually screened and about half of the indicated readings were removed. Finally, a visual screening of the entire daily data base was made to ascertain if any additional readings should be removed. This three-step procedure resulted in the removal of 60 outliers out of a total of 10,673 daily $NO_2$ readings (about 0.6%). The number of outliers is summarized by site in Table 4.5.

The mean criterion used for the data screening (i.e., STEP 1) was as follows:

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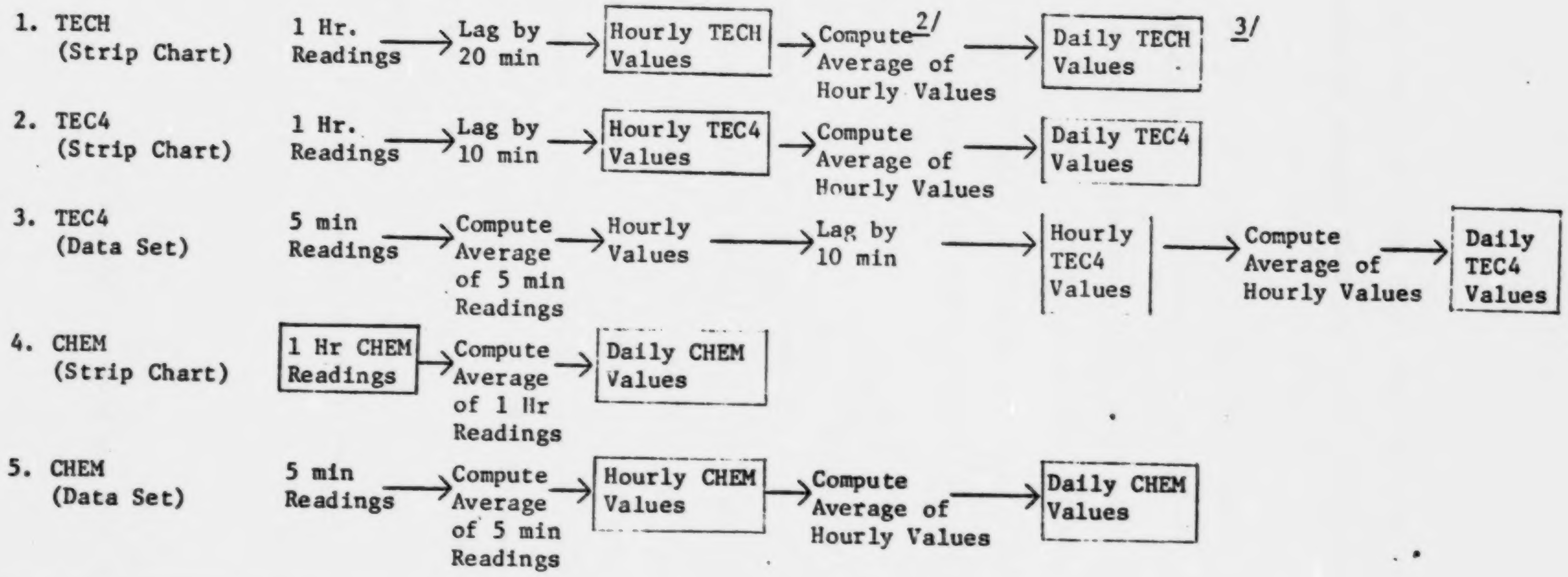
[1] Procedures for the hourly data are given in Section 4.5.

Table 4.4

Procedure Used by EPA for Constructing Daily Values for Continuous Monitors[1]


1. TECH (Strip Chart)
1 Hr. Readings
Lag by 20 min
Hourly TECH Values
Compute[2] Average of Hourly Values
Daily TECH Values
3/
2. TEC4 (Strip Chart)
1 Hr. Readings
Lag by 10 min
Hourly TEC4 Values
Compute Average of Hourly Values
Daily TEC4 Values
3. TEC4 (Data Set)
5 min Readings
Compute Average of 5 min Readings
Hourly Values
Lag by 10 min
Hourly TEC4 Values
Compute Average of Hourly Values
Daily TEC4 Values
4. CHEM (Strip Chart)
1 Hr CHEM Readings
Compute Average of 1 Hr Readings
Daily CHEM Values
5. CHEM (Data Set)
5 min Readings
Compute Average of 5 min Readings
Hourly CHEM Values
Compute Average of Hourly Values
Daily CHEM Values

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[1] All averages computed require that at least 75% of the terms be available. Two point moving averages are used to lag data. All averages are arithmetic averages. All readings are in $\mu g/m^3$.

[2] In computing daily averages, total time averaged is matched to the time period during which bubblers are operational.

[3] A ☐ indicates that this reading is given by EPA to RTI.

Table 4.5

Number of Outliers, By Site

| Site | No. Daily Readings | STEP 1 | STEP 2 | STEP 3 | No. Outliers Removed = STEP 2 + STEP 3 |
|---|---|---|---|---|---|
| 632 | 1809 | 16 | 6 | 2 | 8 |
| 633 | 1825 | 10 | 4 | 0 | 4 |
| 901 | 1383 | 1 | 1 | 2 | 3 |
| 902 | 1482 | 6 | 1 | 0 | 1 |
| 831 | 447 | 6 | 1 | 0 | 1 |
| 832 | 1420 | 15 | 7 | 1 | 8 |
| 841 | 958 | 35 | 20 | 8 | 28 |
| 832D | 1349 | 11 | 6 | 1 | 7 |
| Total | 10,673 | 100 | 46* | 14 | 60 |

STEP 1: Listing of readings in violation of mean criterion.

STEP 2: Outliers from visual screening of listing in STEP 1.

STEP 3: Additional outliers from visual screening of entire daily data base.

* Includes 8 zero or negative readings.

Suppose k different methods provided $NO_2$ readings at a particular site on the $j^{th}$ day. Then the $i^{th}$ method would not be detected as a potential outlier if

$$\frac{1}{4}\,\overline{X}_j^{(i)} \quad < \quad X_{ij} \quad < \quad 4\,\overline{X}_j^{(i)}$$

where

$$X_{ij} = NO_2 \text{ reading by method } i \text{ for the } j^{th} \text{ day}$$

and

$$\overline{X}_j^{(i)} = \text{mean of } NO_2 \text{ readings by the other } (k-1) \text{ methods for the } j^{th} \text{ day.}$$

Table 4.6 presents a listing of the 60 daily $NO_2$ outliers by site. For each site, the listing gives the sampling day, the $NO_2$ readings for all methods present on that day and the name of the method (or methods) whose value is an outlier (listed under M1, etc.).

Table 4.7 presents the number of daily readings (unpaired) after removing the 60 outliers by site and method. The remainder of the daily data analysis (Section 4.4) is based on these screened data.

Table 4.6

LISTING OF CUTLIERS -- DAILY DATA

SITE=632

| DAY | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSC | TECH | TEC4 | CHEM | Method(s) which is outlier<br>M1 | M2 | M3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100 | 35.5 | * | 22.7 | 24.0 | 51.3 | 32.4 | 16.2 | 60.2 | 13.0 | TEAF | | |
| 152 | 22.7 | 10.4 | 13.4 | 10.0 | 97.9 | 7.3 | 49.2 | 12.4 | 29.0 | CHESSC | | |
| 156 | 80.6 | 48.0 | 58.1 | 54.8 | 61.6 | 45.6 | | 521.1 | 149.3 | TEC4 | | |
| 163 | 307.2 | 33.7 | 30.4 | 38.5 | 37.3 | 18.4 | 49.0 | 29.7 | 24.9 | FRMF | | |
| 194 | 39.4 | 18.1 | 22.0 | 91.4 | 23.8 | 16.9 | 29.0 | | 25.9 | CHRO | | |
| 208 | 6.5 | 23.9 | 23.2 | 26.8 | 27.4 | 18.6 | 56.4 | 32.4 | 34.5 | FRMF | | |
| 228 | 47.0 | 29.2 | 110.0 | 45.8 | 29.2 | | | | 45.0 | CHRF | | |
| 247 | 30.9 | 6.3 | 37.3 | 51.4 | 18.7 | | | 44.1 | 38.7 | TEAF | | |

N=8

SITE=633

| DAY | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSC | TECH | TEC4 | CHEM | M1 | M2 | M3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 108.3 | 62.1 | 80.1 | 76.9 | 11.9 | 97.3 | 155.3 | 113.2 | 69.5 | CHESSC | | |
| 100 | 66.4 | 30.4 | 36.5 | 36.7 | 11.4 | 60.7 | 69.8 | 49.5 | 54.8 | CHESSC | | |
| 153 | 63.3 | 28.5 | 32.7 | 28.4 | 38.7 | 26.1 | 188.0 | 56.6 | 41.5 | TECH | | |
| 276 | 25.8 | 9.2 | * | 11.8 | 25.6 | | | 16.8 | 19.9 | CHRF | | |

N=4

SITE=901

| DAY | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSC | TECH | TEC4 | CHEM | M1 | M2 | M3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 188 | 53.0 | 28.4 | 32.5 | 43.9 | 6.6 | 27.3 | | | | CHESSC | | |
| 201 | 132.2 | 53.7 | 74.5 | 80.8 | 315.8 | 58.4 | | | | CHESSC | | |
| 239 | 310.9 | | 114.9 | 86.9 | 105.9 | | | 97.5 | 105.7 | FRMF | | |

N=3

Table 4.6 (Continued)

LISTING OF OUTLIERS -- DAILY DATA

SITE=902

| DAY | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSC | TECH | TEC4 | CHEM | Method(s) which is outlier<br>M1 | M2 | M3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 191 | 60.5 | 30.9 | 35.9 | 48.9 | * | 25.9 | | | | CHESSC | | |

N=1

SITE=831

| DAY | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSC | TECH | TEC4 | CHEM | M1 | M2 | M3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 89 | | 45.3 | 70.7 | | 13.3 | 46.4 | | 262.1 | | TEC4 | | |

N=1

SITE=832

| DAY | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSC | TECH | TEC4 | CHEM | M1 | M2 | M3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79 | | 8.2 | 56.2 | 49.8 | 75.7 | | | 115.8 | 105.4 | TEAF | | |
| 80 | 6.9 | 36.4 | 26.1 | | 39.5 | | | 80.0 | 76.2 | FRMF | | |
| 89 | 69.0 | 3.3 | 47.6 | 48.8 | 24.9 | 11.6 | | 103.6 | * | TEAF | CHEM | |
| 90 | 92.9 | 1.3 | 55.5 | 47.1 | 48.9 | 32.2 | | | | TEAF | | |
| 116 | 173.5 | 71.2 | 83.8 | 87.5 | 300.7 | 66.8 | | | | CHESSC | | |
| 121 | | 1.9 | 50.1 | 49.2 | 75.8 | 34.7 | | | | TEAF | | |
| 178 | 18.1 | 2.4 | 4.2 | 1.3 | 273.7 | | | | | CHESSC | | |

N=7

Table 4.6 (Continued)

LISTING OF OUTLIERS--DAILY DATA

SITE=841

| DAY | FRMF | TEAF | CHRF | CHRC | CHESSC | TGSC | TECM | TEC4 | CHEM | Method(s) which is outlier<br>M1 | M2 | M3 | M4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 96.8 | 3.5 | | 90.5 | 19.7 | | | 152.3 | 83.4 | TEAF | | | |
| 38 | 90.1 | 55.8 | 67.9 | 68.0 | 16.4 | | | 47.4 | 60.2 | CHESSC | | | |
| 43 | 52.6 | 48.8 | 61.1 | 55.8 | 15.3 | | | | | CHESSC | | | |
| 47 | 70.5 | 70.8 | 62.0 | 44.9 | | | | 255.9 | 52.5 | TEC4 | | | |
| 49 | 9.7 | 58.8 | 50.1 | 47.4 | 45.5 | | | | | FRMF | | | |
| 54 | | | | | 71.9 | | | 308.9 | 95.5 | TEC4 | | | |
| 79 | 39.1 | 67.5 | 83.8 | 89.4 | 62.3 | | | 223.3 | 216.2 | FRMF | | | |
| 114 | 134.0 | 5.8 | 69.8 | 80.7 | 93.9 | 83.5 | | | | TEAF | | | |
| 116 | 168.1 | 122.4 | 129.8 | 156.7 | | 157.9 | | | 0.4 | CHEM | | | |
| 119 | 7.1 | 76.3 | | 87.9 | 59.4 | | | | | FRMF | | | |
| 126 | 9.7 | 101.0 | 2.7 | 2.5 | 101.1 | 4.4 | | | | TEAF | CHESSO | | |
| 135 | 33.4 | | 33.4 | 5.8 | 47.2 | | | 40.6 | | CHRC | | | |
| 136 | 39.4 | 20.2 | 2.5 | 28.0 | 56.6 | 20.0 | | 56.0 | | CHRF | | | |
| 142 | 29.9 | 57.0 | 63.5 | 2.5 | 38.5 | 56.1 | | | | CHRC | | | |
| 145 | 308.9 | | | 40.8 | 72.4 | | | 67.9 | | FRMF | | | |
| 149 | 56.9 | 6.0 | 42.8 | 2.6 | 62.0 | 34.2 | | 56.1 | | TEAF | CHRC | | |
| 155 | 13.6 | 57.3 | 62.5 | 5.1 | 60.4 | 49.6 | | | | FRMF | CHRC | | |
| 160 | 7.3 | 1.3 | 8.6 | | | 1.2 | | | 101.4 | CHEM | | | |
| 165 | 107.0 | 17.0 | 9.3 | 26.2 | | | | | | FRMF | | | |
| 166 | 58.6 | 32.7 | 11.1 | 31.1 | | * | | 104.2 | | TGSC | | | |
| 171 | 15.0 | | 5.8 | 17.1 | 53.3 | 1.2 | | 67.9 | | FRMF | CHRF | CHRC | TGSC |
| 275 | 94.0 | | 4.1 | 64.7 | | | | | | CHRF | | | |

N=22

SITE=832 DLP

Table 4.6 (Continued)

LISTING OF OUTLIERS--DAILY DATA

| | | | | | | | | | | Method(s) which is outlier | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DAY | FRMF | TEAF | CHRF | CHRC | CHESSC | TGSC | TECH | TEC4 | CHEM | M1 | M2 | M3 | M4 |
| 143 | 122.1 | 2.5 | 86.4 | 73.4 | 75.8 | 64.3 | | | | TEAF | | | |
| 144 | 136.6 | | 101.1 | 96.1 | * | 71.9 | | | | CHESSC | | | |
| 145 | 154.8 | 102.4 | 398.8 | | | | | | | CHRF | | | |
| 164 | 135.6 | | 37.9 | | * | 37.1 | | | | CHESSC | | | |
| 166 | 147.4 | | 78.2 | 80.4 | 76.5 | 10.0 | | 108.9 | 117.8 | TGSC | | | |
| 178 | 20.3 | 3.6 | 5.9 | | 328.3 | | | | | CHESSC | | | |
| 198 | | 196.1 | 230.7 | 228.0 | * | 193.4 | | | | CHESSC | | | |

N=7

* = value not shown because it was below instrument detection limits (there are eight of these cases).

## Table 4.7

## Number of Daily Measurements by Method and Site After Removing Outliers--Sampling Period July 1, 1972, - April 30, 1973, Unpaired Data

| | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSO | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| Chatt. | | | | | | | | | |
| 632 | 221 | 226 | 224 | 230 | 250 | 114 | 164 | 182 | 190 |
| 633 | 234 | 230 | 230 | 232 | 244 | 112 | 163 | 180 | 196 |
| St. Louis | | | | | | | | | |
| 901 | 244 | 246 | 245 | 242 | 206 | 123 | * | 28 | 46 |
| 902 | 244 | 242 | 244 | 243 | 203 | 118 | * | 85 | 102 |
| Calif. | | | | | | | | | |
| 831 | 56 | 54 | 57 | 55 | 143 | 11 | * | 25 | 45 |
| 832 | 202 | 182 | 219 | 195 | 232 | 105 | * | 143 | 134 |
| 841 | 203 | 187 | 207 | 198 | 201 | 101 | * | 105 | 119 |
| 832D | 143 | 139 | 157 | 145 | 149 | 83 | * | 69 | 66 |
| Total | 1547 | 1506 | 1583 | 1540 | 1628 | 767 | 327 | 817 | 898 |
| Number of Outliers Removed | 11 | 11 | 6 | 6 | 15 | 3 | 1 | 4 | 3 |

* = method not present

## 4.4 Analysis of Daily Data

### a. Introduction

In this section the daily screened $NO_2$ data described in Section 4.2 and 4.3 is analyzed. This analysis includes (i) paired comparisons of methods (Section 4.4.b); e.g., paired means, correlations and ratio of means, (ii) estimated relationships between pairs of methods (Section 4.4.c) by using regression techniques, (iii) unpaired summary statistics by method (Section 4.4.d); e.g., means, standard deviations and frequency distributions, and (iv) analysis of duplicate data (Section 4.4.e).

### b. Paired Comparisons of Methods

Data for two particular monitoring methods may not occur at the same site at the same time. Accordingly, since there is a large amount of missing daily $NO_2$ data, a simple comparison of means for two methods (as in Section 4.4.d) may lead to incorrect conclusions. Hence, in this subsection two methods are compared only for those days for which observations are available for both methods. Table 4.8 presents a summary of the paired data. Data from the seven primary sites (excluding site 832D), when both methods of a pair occur at a site, have been pooled together. In particular, Table 4.8 presents the number of observations N (i.e., the number of paired site-days) for each pair of methods. Note that on the diagonal of the table (i.e., where the same method is in the column and row heading) N is the total number of observations for a particular method. The off-diagonal entries of the table give the arithmetic means, the ratio of the

Table 4.8

Summary Statistics[4] for Paired Observations--

for Data Combined Over Sites[1]

| | | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSO | TECH[2] | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|---|
| FRMF | N | 1404 | 1290 | 1337 | 1313 | 1166 | 648 | 265 | 637 | 648 |
| | FRMF MEAN | 76.7 | 75.3 | 76.6 | 75.9 | 75.6 | 80.7 | 56.0 | 72.6 | 72.1 |
| | Col. MEAN | | 38.1 | 49.0 | 46.9 | 54.9 | 39.0 | 56.3 | 61.9 | 56.6 |
| | Ratio[3] | | 1.98 | 1.56 | 1.6 | 1.38 | 2.07 | .99 | 1.17 | 1.27 |
| | Corr. | | .81 | .77 | .79 | .59 | .69 | .55 | .71 | .69 |
| TEAF | N | 1290 | 1367 | 1310 | 1285 | 1141 | 625 | 266 | 619 | 635 |
| | TEAF MEAN | 38.1 | 38.2 | 38.1 | 37.9 | 37.4 | 38.4 | 28.1 | 35.6 | 35.9 |
| | Col. MEAN | 75.3 | | 48.5 | 46.4 | 53.8 | 37.8 | 56.8 | 58.8 | 55.0 |
| | Ratio | .51 | | .79 | .82 | .70 | 1.01 | .49 | .61 | .65 |
| | Corr. | .81 | | .85 | .86 | .61 | .76 | .73 | .76 | .76 |
| CHRF | N | 1337 | 1310 | 1426 | 1326 | 1184 | 650 | 268 | 655 | 663 |
| | CHRF MEAN | 49.0 | 48.5 | 49.3 | 49.0 | 48.4 | 47.4 | 32.0 | 46.4 | 47.2 |
| | Col. MEAN | 76.6 | 38.1 | | 47.0 | 55.1 | 38.9 | 56.9 | 62.2 | 56.9 |
| | Ratio | .64 | 1.27 | | 1.04 | .88 | 1.22 | .56 | .75 | .83 |
| | Corr. | .77 | .85 | | .93 | .62 | .81 | .71 | .72 | .73 |
| CHRO | N | 1313 | 1285 | 1326 | 1395 | 1169 | 633 | 270 | 643 | 650 |
| | CHRO MEAN | 46.9 | 46.4 | 47.0 | 47.2 | 46.3 | 46.6 | 32.4 | 43.9 | 44.5 |
| | Col. MEAN | 75.9 | 37.9 | 49.0 | | 54.6 | 38.7 | 56.7 | 61.7 | 56.4 |
| | Ratio | .63 | 1.22 | .96 | | .85 | 1.20 | .57 | .71 | .79 |
| | Corr. | .79 | .86 | .93 | | .59 | .79 | .68 | .75 | .74 |

Table 4.8 (Continued)

| | | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSO | TECH2/ | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|---|
| CHESSO | N | 1166 | 1141 | 1184 | 1169 | 1479 | 556 | 261 | 635 | 645 |
| | CHESSO MEAN | 54.9 | 53.8 | 55.1 | 54.6 | 55.0 | 60.1 | 35.0 | 51.1 | 52.3 |
| | Col. MEAN | 75.6 | 37.4 | 48.4 | 46.3 | | 38.6 | 55.1 | 62.3 | 57.7 |
| | Ratio | .72 | 1.43 | 1.14 | 1.18 | | 1.56 | .64 | .82 | .91 |
| | Corr. | .59 | .61 | .62 | .59 | | .50 | .29 | .65 | .60 |
| TGSO | N | 648 | 625 | 650 | 633 | 556 | 684 | 191 | 302 | 351 |
| | TGSO MEAN | 39.0 | 37.8 | 38.9 | 38.7 | 38.6 | 39.1 | 28.8 | 39.5 | 35.7 |
| | Col. MEAN | 80.7 | 38.4 | 47.4 | 46.6 | 60.1 | | 56.1 | 65.9 | 56.8 |
| | Ratio | .48 | .99 | .82 | .83 | .64 | | .51 | .60 | .63 |
| | Corr. | .69 | .76 | .81 | .79 | .50 | | .54 | .72 | .73 |
| TECH | N | 265 | 266 | 268 | 270 | 261 | 191 | 327 | 227 | 222 |
| | TECH MEAN | 56.3 | 56.8 | 56.9 | 56.7 | 55.1 | 56.1 | 57.1 | 59.2 | 56.0 |
| | Col. MEAN | 56.0 | 28.1 | 32.0 | 32.4 | 35.0 | 28.8 | | 44.6 | 44.3 |
| | Ratio | 1.01 | 2.04 | 1.79 | 1.75 | 1.56 | 1.96 | | 1.33 | 1.27 |
| | Corr. | .55 | .73 | .71 | .68 | .29 | .54 | | .56 | .64 |
| TEC4 | N | 637 | 619 | 655 | 643 | 635 | 302 | 227 | 748 | 545 |
| | TEC4 MEAN | 61.9 | 58.8 | 62.2 | 61.7 | 62.3 | 65.9 | 44.6 | 62.9 | 63.5 |
| | Col. MEAN | 72.6 | 35.6 | 46.4 | 43.9 | 51.1 | 39.5 | 59.2 | | 59.9 |
| | Ratio | .85 | 1.64 | 1.33 | 1.41 | 1.22 | 1.67 | .75 | | 1.06 |
| | Corr. | .71 | .76 | .72 | .75 | .65 | .72 | .56 | | .83 |

Table 4.8 (Continued

| | | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSO | TECH[2/] | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|---|
| CHEM | N | 648 | 635 | 663 | 650 | 645 | 351 | 222 | 545 | 832 |
| | CHEM MEAN | 56.6 | 55.0 | 56.9 | 56.4 | 57.7 | 56.8 | 44.3 | 59.9 | 58.3 |
| | Col. MEAN | 72.1 | 35.9 | 47.2 | 44.5 | 52.3 | 35.7 | 56.0 | 63.5 | |
| | Ratio | .79 | 1.54 | 1.20 | 1.27 | 1.10 | 1.59 | .79 | .94 | |
| | Corr. | .69 | .76 | .73 | .74 | .60 | .73 | .64 | .83 | |

1/ Unless otherwise indicated, data is from sites = 632, 633, 901, 902, 831, 832, 841, (832D eliminated).

2/ Data for TECH from sites 632 and 633 only.

3/ Ratio of arithmetic means (row method in numerator).

4/ The statistics in this table are shown for descriptive purposes only. Their general use is not recommended (see Section 5.4).

means and the correlations for each pair of methods. The ratios are taken such that the row mean is always in the numerator[1].

Table 4.9 reformats some of the same information contained in Table 4.8. The methods have been ordered (approximately) by the magnitudes of their means--from largest to smallest. The first portion of Table 4.9 again shows the ratios of the arithmetic means. In terms of the magnitude of these ratios, this table indicates that the methods fall basically into five groups indicated by the dashed lines in the table:

(1) TECH and FRMF the largest,
(2) TEC4 and CHEM next,
(3) CHESSO,
(4) CHRF and CHRO, and
(5) TGSO and TEAF, the smallest.

These groupings may indicate that the collection efficiencies used for the 24-hour integrated sampling methods are inappropriate. Recall that these collection efficiencies are 35% for the FRMF and CHESSO, 85% for the CHRF and CHRO, and 100% for the TGSO and TEAF.

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[1] RTI has also examined the ratios of geometric means and the correlations between methods on a logarithmic scale (see Appendix Table D-1). However, these quantities were usually quite similar to the ratios and correlations given in Table 4.8.

## Table 4.9

## Ratios of Arithmetic Means and Correlations[2] Between Methods Over the Seven[1] Primary Sites

Ratios of Arithmetic Means (Row method in numerator)

| | TECH | FRMF | TEC4 | CHEM | CHESSO | CHRF | CHRO | TGSO | TEAF |
|---|---|---|---|---|---|---|---|---|---|
| TECH | 1.00 | 1.01 | 1.33 | 1.27 | 1.56 | 1.79 | 1.75 | 1.96 | 2.04 |
| FRMF | .99 | 1.00 | 1.17 | 1.27 | 1.38 | 1.56 | 1.60 | 2.07 | 1.98 |
| TEC4 | .75 | .85 | 1.00 | 1.06 | 1.22 | 1.33 | 1.41 | 1.67 | 1.64 |
| CHEM | .79 | .79 | .94 | 1.00 | 1.10 | 1.20 | 1.27 | 1.59 | 1.54 |
| CHESSO | .64 | .72 | .82 | .91 | 1.00 | 1.14 | 1.18 | 1.56 | 1.43 |
| CHRF | .56 | .64 | .75 | .83 | .88 | 1.00 | 1.04 | 1.22 | 1.27 |
| CHRO | .57 | .63 | .71 | .79 | .85 | .96 | 1.00 | 1.20 | 1.22 |
| TGSO | .51 | .48 | .60 | .63 | .64 | .82 | .83 | 1.00 | .99 |
| TEAF | .49 | .51 | .61 | .65 | .70 | .79 | .82 | 1.01 | 1.00 |

Correlations

| | TECH | FRMF | TEC4 | CHEM | CHESSO | CHRF | CHRO | TGSO | TEAF |
|---|---|---|---|---|---|---|---|---|---|
| TECH | 1.00 | .55 | .56 | .64 | .29 | .71 | .68 | .54 | .73 |
| FRMF | | 1.00 | .71 | .69 | .59 | .77 | .79 | .69 | .81 |
| TEC4 | | | 1.00 | .83 | .65 | .72 | .75 | .72 | .76 |
| CHEM | | | | 1.00 | .60 | .73 | .74 | .73 | .76 |
| CHESSO | | | | | 1.00 | .62 | .59 | .50 | .61 |
| CHRF | | | | | | 1.00 | .93 | .81 | .85 |
| CHRO | | | | | | | 1.00 | .79 | .86 |
| TGSO | | | | | | | | 1.00 | .76 |
| TEAF | | | | | | | | | 1.00 |

[1] TECH in 632, 633 only, other methods in 632, 633, 901, 902, 831, 832, 841.

[2] The statistics in this table are shown for descriptive purposes only. Their general use is not recommended (see Section 5.4).

The correlations between methods[1] given in the second portion of Table 4.9 show that (a) the highest correlation is between CHRF and CHRO (= .93), (b) the highest correlations are generally between four of the five bubbler methods: CHRF, CHRO, FRMF, and TEAF (range = .77 - .93), (c) the TEC4 and CHEM correlate fairly well with each other (= .83) but have somewhat poorer correlations with the CHRF, CHRO, FRMF, TGSO, and TEAF (range = .69 - .76), (d) the CHESSO does not correlate very well with any other method (range = .29 - .65), (e) the TECH and TEC4 do not correlate well (= .56). Tables 4.10 and 4.11 are presented to illustrate how the ratios and correlations shown in Table 4.9 (over sites) vary from site to site. Table 4.10 gives the ratios of the arithmetic means by site for selected pairs of methods (Appendix Table C-1 gives these ratios by site for all pairs of methods). These ratios are based only on those N days for which both methods furnished readings. Table 4.10 shows relatively consistent ratios from site to site for the CHRF/CHRO pair (range over

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[1] This terminology has been and will continue to be used. However, it should be noted that "correlations between methods" or "correlation of method X with method Y" might more accurately be phrased as "correlations between readings of methods." Hence, a high "correlation between two methods" indicates that they respond to changes (presumably, in levels of $NO_2$ concentrations) in similar, linear fashions, although perhaps on independent scales. Thus, if day-to-day variations in $NO_2$ were absent, the correlations between all methods should be zero; for a site which exhibits stable day-to-day $NO_2$ concentrations, one would thus expect to observe smaller "correlations between methods" than for a site with a large variability in (true) $NO_2$ levels.

### Table 4.10

### Ratios of Arithmetic Means[1] for Selected Pairs of Methods, by Site

| | Sites | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 632 | 633 | 901 | 902 | 831 | 832 | 841 | Total |
| **CHRF/CHRO** | | | | | | | | |
| No. Obs. | 219 | 225 | 236 | 237 | 49 | 185 | 175 | 1326 |
| Ratio | 1.01 | 1.04 | 1.07 | 1.05 | 1.02 | 1.06 | 1.02 | 1.04 |
| **CHESSO/CHRO** | | | | | | | | |
| No. Obs. | 216 | 206 | 193 | 185 | 51 | 166 | 152 | 1169 |
| Ratio | 1.00 | 1.07 | 1.28 | 1.32 | 1.05 | 1.23 | 1.15 | 1.18 |
| **CHEM/CHRO** | | | | | | | | |
| No. Obs. | 164 | 171 | 43 | 82 | 12 | 102 | 76 | 650 |
| Ratio | 1.15 | 1.08 | 1.24 | 1.35 | 1.11 | 1.33 | 1.56 | 1.27 |
| **FRMF/CHRO** | | | | | | | | |
| No. Obs. | 218 | 228 | 235 | 238 | 47 | 171 | 176 | 1313 |
| Ratio | 1.64 | 1.66 | 1.65 | 1.69 | 1.40 | 1.73 | 1.39 | 1.60 |
| **CHEM/TEC4** | | | | | | | | |
| No. Obs. | 126 | 132 | 28 | 60 | 12 | 107 | 80 | 545 |
| Ratio | .87 | 1.03 | 1.32 | .96 | .73 | .83 | 1.03 | .94 |

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[1] The statistics in this table are shown for descriptive purposes only. Their general use is not recommended (see Section 5.4).

Table 4.11

Correlations Between Methods - By Site

| Method | Site | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSO | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|---|
| FRMF | 632 | 1.0 | .79 | .62 | .64 | .41 | .41 | .42 | .47 | .51 |
| | 633 | ↑ | .72 | .58 | .67 | .45 | .29 | .63 | .43 | .43 |
| | 901 | | .72 | .72 | .72 | .31 | .57 | --- | .83 | .73 |
| | 902 | | .74 | .66 | .74 | .37 | .25 | --- | .61 | .50 |
| | 831 | | .74 | .78 | .33 | .65 | .87* | --- | .33* | .09* |
| | 832 | | .80 | .77 | .76 | .55 | .82 | --- | .66 | .70 |
| | 841 | ↓ | .79 | .75 | .79 | .57 | .76 | --- | .65 | .61 |
| | 832D[1/] | 1.0 | .72 | .64 | .67 | .43 | .66 | --- | .67 | .62 |
| TEAF | 632 | .79 | 1.0 | .71 | .73 | .48 | .56 | .59 | .59 | .64 |
| | 633 | .72 | | .73 | .77 | .49 | .63 | .87 | .60 | .71 |
| | 901 | .72 | ↑ | .79 | .77 | .39 | .62 | --- | .72 | .82 |
| | 902 | .74 | | .83 | .84 | .49 | .52 | --- | .77 | .73 |
| | 831 | .74 | | .85 | .81 | .71 | .80* | --- | .88* | .46* |
| | 832 | .80 | | .88 | .89 | .57 | .85 | --- | .72 | .74 |
| | 841 | .79 | ↓ | .74 | .78 | .51 | .82 | --- | .66 | .57 |
| | 832D | .72 | 1.0 | .91 | .90 | .62 | .90 | --- | .92 | .83 |
| CHRF | 632 | .62 | .71 | 1.0 | .86 | .31 | .63 | .57 | .49 | .57 |
| | 633 | .58 | .73 | ↑ | .86 | .42 | .66 | .80 | .53 | .51 |
| | 901 | .72 | .79 | | .91 | .39 | .68 | --- | .65 | .73 |
| | 902 | .66 | .83 | | .93 | .42 | .62 | --- | .78 | .66 |
| | 831 | .78 | .85 | | .95 | .68 | .54 | --- | .75* | .79* |
| | 832 | .77 | .88 | | .94 | .59 | .89 | --- | .61 | .66 |
| | 841 | .75 | .74 | ↓ | .85 | .59 | .84 | --- | .72 | .64 |
| | 832D | .64 | .91 | 1.0 | .88 | .60 | .87 | --- | .83 | .77 |
| CHRO | 632 | .64 | .73 | .86 | 1.0 | .31 | .61 | .52 | .52 | .50 |
| | 633 | .67 | .77 | .86 | ↑ | .43 | .60 | .81 | .52 | .53 |
| | 901 | .72 | .77 | .91 | | .35 | .67 | --- | .73 | .73 |
| | 902 | .74 | .84 | .93 | | .42 | .57 | --- | .75 | .60 |
| | 831 | .73 | .81 | .95 | | .73 | .90* | --- | .75* | .81* |
| | 832 | .76 | .89 | .94 | | .54 | .89 | --- | .69 | .70 |
| | 841 | .79 | .78 | .85 | ↓ | .52 | .77 | --- | .74 | .65 |
| | 832D | .67 | .90 | .88 | 1.0 | .60 | .84 | --- | .78 | .74 |
| CHESSO | 632 | .41 | .48 | .31 | .31 | 1.0 | .18 | .15 | .26 | .34 |
| | 633 | .45 | .49 | .42 | .43 | ↑ | .25 | .40 | .21 | .40 |
| | 901 | .31 | .39 | .39 | .35 | | .24 | --- | .48 | .43 |
| | 902 | .37 | .49 | .42 | .42 | | .09 | --- | .35 | .45 |
| | 831 | .65 | .71 | .68 | .73 | | .80* | --- | .71 | .40 |
| | 832 | .55 | .57 | .59 | .54 | | .52 | --- | .65 | .48 |
| | 841 | .57 | .51 | .59 | .52 | ↓ | .50 | --- | .36 | .49 |
| | 832D | .43 | .62 | .60 | .60 | 1.0 | .59 | --- | .74 | .70 |

Table 4.11(Continued)

| Method | Site | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSO | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|---|
| TGSO | 632 | .41 | .56 | .63 | .61 | .18 | 1.0 | .42 | .63 | .41 |
| | 633 | .29 | .63 | .66 | .60 | .25 | | .59 | .39 | .55 |
| | 901 | .57 | .62 | .68 | .67 | .24 | ↑ | --- | .80 | .95 |
| | 902 | .25 | .52 | .62 | .57 | .09 | | --- | .76 | .39 |
| | 831 | .87* | .80* | .54 | .90* | .80* | | --- | .72 | --- |
| | 832 | .82 | .85 | .89 | .89 | .52 | | --- | .79 | .88 |
| | 841 | .76 | .82 | .84 | .77 | .50 | ↓ | --- | .90 | .75 |
| | 832D | .66 | .90 | .87 | .84 | .59 | 1.0 | --- | .89 | .89 |
| TECH | 632 | .42 | .59 | .57 | .52 | .15 | .42 | 1.0 | .55 | .48 |
| | 633 | .63 | .87 | .80 | .81 | .40 | .59 | 1.0 | .67 | .75 |
| TEC4 | 632 | .47 | .59 | .49 | .52 | .26 | .63 | .55 | 1.0 | .64 |
| | 633 | .43 | .60 | .53 | .52 | .21 | .39 | .67 | | .50 |
| | 901 | .83 | .72 | .65 | .73 | .48 | .80 | --- | ↑ | .79 |
| | 902 | .61 | .77 | .78 | .75 | .35 | .76 | --- | | .58 |
| | 831 | .33* | .88* | .75* | .75* | .71 | .72 | --- | | .89* |
| | 832 | .66 | .72 | .61 | .69 | .65 | .79 | --- | | .88 |
| | 841 | .65 | .66 | .72 | .74 | .36 | .90 | --- | ↓ | .74 |
| | 832D | .67 | .92 | .83 | .78 | .74 | .89 | --- | 1.0 | .96 |
| CHEM | 632 | .51 | .64 | .57 | .50 | .34 | .41 | .48 | .64 | 1.0 |
| | 633 | .43 | .71 | .51 | .53 | .40 | .55 | .75 | .50 | |
| | 901 | .73 | .82 | .73 | .73 | .43 | .95 | --- | .79 | ↑ |
| | 902 | .50 | .73 | .66 | .60 | .45 | .39 | --- | .58 | |
| | 831 | .09* | .46* | .79* | .81* | .40 | --- | --- | .89* | |
| | 832 | .70 | .74 | .66 | .70 | .48 | .88 | --- | .88 | |
| | 841 | .61 | .57 | .64 | .65 | .49 | .75 | --- | .74 | ↓ |
| | 832D | .62 | .83 | .77 | .74 | .70 | .89 | --- | .96 | 1.0 |

1/ Duplicate readings were obtained in site 832.

* Based on fewer than 20 paired observations (recall that at site 831 all methods were moved to site 832 in October, 1972 except for CHESSO and CHEM).

seven sites from 1.01 to 1.07). This reflects the high correlation (.93) between these two methods. On the other hand, the ratios for the other pairs of methods shown in the table demonstrate less consistency from site to site; e.g., the CHESSO/CHRO ratios range from 1.00 to 1.32, the CHEM/CHRO ratios, from 1.08 to 1.56.

The correlations between the methods given in Table 4.11 vary a great deal over the various sites. The variation of these correlations could be due to a great many factors. These factors include the following: (i) the true $NO_2$ variability from day to day may be characteristically different for different sites, (ii) the sample sizes vary a great deal over sites, (iii) the effect of interferences (e.g., NO and ozone) may differ for the various sites (hopefully, the effect of these interferences may be examined in a later report), (iv) a particular method may have malfunctioned at only one site. The table does indicate that the CHESSO method generally has the lowest correlations over sites. It is also interesting to note that the TECH always has higher correlations in site 633 than in site 632.

In the early months of the present study (i.e., July through October, 1972) EPA had many problems in collecting the $NO_2$ data. For example, many difficulties were encountered in calibrating the continuous monitoring methods. In fact, at one time EPA had considered discarding much of the continuous $NO_2$ data collected before November, 1972. Accordingly, RTI also computed means and correlations between monitoring methods for the two time periods (i) July 1, 1972 through October 31, 1972 and (ii) November 1, 1972 through April 30, 1973. The purpose of these calculations was to study if these means and correlations were different for the two time periods. In addition, the two time periods could also provide an indication of seasonal effects on $NO_2$ levels. The results of these mean and correlation calculations are given in Appendix Tables E-1 and E-2. Table E-1 presents the correlations between methods over sites for the two time periods. The table shows that the correlations for the TGSO are definitely higher for the November - April time period and that the CHESSO correlations are also usually higher for this same time period. The other methods show no consistent pattern for the two time periods. A comparison of the November - April correlations with the corresponding correlations for the entire sampling period, (July, 1972 - April, 1973) indicates that only the TGSO correlations were noticeably increased for the November - April period.

Table E-2 shows the unpaired sample means by site and method for the two time periods. This table indicates the following: (i) the TGSO is higher for the July - October time period, (ii) the CHESSO is usually higher for the November - April time period, (iii) the continuous methods are usually higher for the July - October period, (iv) in the Chattanooga sites (632 and 633) the non-continuous methods (except TGSO) are higher for the November - April period while the continuous methods are lower for this time period, (v) in St. Louis site 901 the non-continuous methods show higher readings for the July - October period while in site 902 these same methods are usually higher for the November - April period, (vi) in California site 832 the November - April period has higher readings for most methods while in site 841 the opposite is true. Thus, in general, it is impossible to say from the current data which time period gives the higher readings over all sites. Instead, there is obviously a large site effect (due perhaps to interferences such as NO and ozone); therefore, conclusions about seasonal levels of $NO_2$ must be made by site rather than over all sites. One can say however that the analysis over sites of the two time periods does indicate that the data for the TGSO method for the July through October period has relatively low correlations and high means. Although RTI did not discard this early TGSO data from its analysis, the data certainly is questionable in view of the results shown in Tables E-1 and E-2.

At the request of EPA, RTI also computed the means of ratios by site and $NO_2$ concentration interval for four pairs of monitoring methods[1]. In particular, the intervals were 0-60, 60-90, 90-120, 120-150 and >150 $\mu g/m^3$ and the pairs of methods were CHEM/CHRO, FRMF/CHRO, CHEM/TEC4 and FRMF/TEC4. The results of these computations are given in Table 4.12. In the table, the $NO_2$ intervals are based upon the monitoring method in the denominator of the ratio (e.g., CHEM/CHRO implies that the intervals are based upon the

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[1] The means of ratios discussed here should not be confused with the ratios of means given earlier in Tables 4.8, 4.9 and 4.10.

## Table 4.12

## Summary Statistics[1] for Ratios of Daily Readings, By Pair of Methods, Interval and Site

| | | CHEM/CHRO | | | | | FRMF/CHRO | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Site | CHRO Interval µg/m$^3$ | Sample Size | Mean | Std. Dev. | Low | High | Sample Size | Mean | Std. Dev. | Low | High |
| 632 | 0- 60 | 65 | 1.51 | 1.00 | .21 | 6.03 | 103 | 1.92 | 1.03 | .64 | 9.53 |
| | 60- 90 | 98 | 1.08 | .40 | .31 | 2.72 | 114 | 1.61 | .57 | .52 | 4.26 |
| | 90-120 | 1 | 1.36 | 0 | 1.36 | 1.36 | 1 | 1.45 | 0 | 1.45 | 1.45 |
| | 120-150 | 0 | | | | | 0 | | | | |
| | > 150 | 0 | | | | | 0 | | | | |
| 633 | 0- 60 | 78 | 1.31 | .73 | .29 | 4.17 | 117 | 1.94 | 1.09 | .71 | 10.23 |
| | 60- 90 | 93 | 1.00 | .44 | .21 | 2.51 | 111 | 1.56 | .56 | .39 | 4.03 |
| | 90-120 | 0 | | | | | 0 | | | | |
| | 120-150 | 0 | | | | | 0 | | | | |
| | > 150 | 0 | | | | | 0 | | | | |
| 901 | 0- 60 | 0 | | | | | 11 | 2.13 | .54 | 1.51 | 3.52 |
| | 60- 90 | 37 | 1.33 | .25 | .71 | 1.77 | 211 | 1.71 | .37 | .94 | 3.30 |
| | 90-120 | 5 | 1.10 | .26 | .68 | 1.32 | 12 | 1.36 | .31 | .65 | 1.70 |
| | 120-150 | 1 | .85 | 0 | .85 | .85 | 1 | .99 | 0 | .99 | .99 |
| | > 150 | 0 | | | | | 0 | | | | |
| 902 | 0- 60 | 28 | 1.43 | .36 | .40 | 2.07 | .57 | 2.05 | .70 | .97 | 5.58 |
| | 60- 90 | 54 | 1.36 | .38 | .27 | 2.24 | 177 | 1.70 | .43 | .85 | 3.00 |
| | 90-120 | 0 | | | | | 2 | 1.36 | .23 | 1.20 | 1.52 |
| | 120-150 | 0 | | | | | 2 | 1.27 | .23 | 1.11 | 1.44 |
| | > 150 | 0 | | | | | 0 | | | | |
| 832 | 0- 60 | 11 | 2.02 | .79 | 1.19 | 3.36 | 12 | 3.32 | 3.44 | 1.49 | 13.99 |
| | 60- 90 | 75 | 1.41 | .58 | .41 | 3.03 | 126 | 1.89 | .70 | .25 | 3.89 |
| | 90-120 | 10 | 1.07 | .38 | .75 | 1.84 | 21 | 1.57 | .43 | 1.02 | 2.84 |
| | 120-150 | 4 | 1.37 | .31 | 1.09 | 1.81 | 9 | 1.42 | .35 | 1.02 | 1.92 |
| | > 150 | 2 | 1.12 | .21 | .97 | 1.26 | 3 | 1.55 | .20 | 1.33 | 1.71 |
| 841 | 0- 60 | 6 | 3.05 | 2.77 | 1.15 | 8.57 | 22 | 2.14 | 1.13 | .86 | 5.35 |
| | 60- 90 | 62 | 1.60 | .44 | .75 | 3.02 | 136 | 1.43 | .38 | .53 | 2.58 |
| | 90-120 | 8 | 1.30 | .37 | .79 | 1.73 | 17 | 1.24 | .24 | .88 | 1.63 |
| | 120-150 | 0 | | | | | 0 | | | | |
| | > 150 | 0 | | | | | 1 | 1.07 | 0 | 1.07 | 1.07 |

Table 4.12 (Continued)

| Site | CHRO Interval µg/m³ | [illegible] | | | | | FRMF/CHRO | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample Size | Mean | Std. Dev. | Low | High | Sample Size | Mean | Std. Dev. | Low | High |
| 832D | 0- 60 | 0 | | | | | 1 | 1.61 | 0 | 1.61 | 1.61 |
| | 60- 90 | 43 | 1.31 | .64 | .52 | 4.29 | 98 | 1.66 | .56 | .74 | 3.74 |
| | 90-120 | 10 | 1.23 | .62 | .46 | 2.25 | 17 | 1.41 | .39 | .54 | 2.03 |
| | 120-150 | 2 | 1.66 | .22 | 1.51 | 1.81 | 2 | 1.22 | .47 | .89 | 1.55 |
| | > 150 | 2 | 1.29 | .47 | .96 | 1.62 | 4 | 1.09 | .19 | .92 | 1.26 |

| Site | TEC4 Interval µg/m³ | CHEM/TEC4 | | | | | FRMF/TEC4 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample Size | Mean | Std. Dev. | Low | High | Sample Size | Mean | Std. Dev. | Low | High |
| 632 | 0- 60 | 28 | 1.46 | 1.00 | .84 | 5.98 | 35 | 1.95 | .93 | .82 | 5.42 |
| | 60- 90 | 92 | .88 | .26 | .07 | 1.41 | 119 | 1.27 | .58 | .42 | 4.25 |
| | 90-120 | 4 | .62 | .17 | .50 | .88 | 6 | .91 | .42 | .53 | 1.70 |
| | 120-150 | 2 | .57 | .01 | .56 | .58 | 1 | .81 | 0 | .81 | .81 |
| | > 150 | 0 | | | | | 0 | | | | |
| 633 | 0- 60 | 46 | 1.23 | .81 | .41 | 3.74 | 54 | 1.95 | 1.10 | .56 | 6.00 |
| | 60- 90 | 84 | 1.02 | .51 | .33 | 2.95 | 104 | 1.30 | .62 | .19 | 3.27 |
| | 90-120 | 2 | .49 | .17 | .37 | .61 | 3 | .92 | .11 | .80 | 1.00 |
| | 120-150 | 0 | | | | | 1 | .97 | 0 | .97 | .97 |
| | > 150 | 0 | | | | | 0 | | | | |
| 901 | 0- 60 | 2 | 2.00 | .44 | 1.68 | 2.30 | 2 | 2.30 | .32 | 2.08 | 2.53 |
| | 60- 90 | 23 | 1.43 | .22 | 1.12 | 1.95 | 21 | 1.73 | .38 | 1.04 | 2.57 |
| | 90-120 | 2 | 1.15 | .09 | 1.08 | 1.21 | 1 | 1.36 | 0 | 1.36 | 1.36 |
| | 120-150 | 0 | | | | | 0 | | | | |
| | > 150 | 1 | .66 | 0 | .66 | .66 | 1 | .97 | 0 | .97 | .97 |
| 902 | 0- 60 | 4 | 1.13 | .15 | .96 | 1.30 | 9 | 1.80 | .28 | 1.27 | 2.12 |
| | 60- 90 | 55 | .99 | .30 | .29 | 1.72 | 68 | 1.32 | .37 | .71 | 2.87 |
| | 90-120 | 1 | .90 | 0 | .90 | .90 | 1 | .96 | 0 | .96 | .96 |
| | 120-150 | 0 | | | | | 0 | | | | |
| | > 150 | 0 | | | | | 0 | | | | |
| 832 | 0- 60 | 1 | .60 | 0 | .60 | .60 | 1 | 2.40 | 0 | 2.40 | 2.40 |
| | 60- 90 | 47 | .84 | .20 | .43 | 1.25 | 51 | 1.54 | .64 | .64 | 3.58 |
| | 90-120 | 32 | .87 | .21 | .55 | 1.40 | 33 | 1.09 | .26 | .67 | 1.71 |
| | 120-150 | 16 | .76 | .10 | .63 | .96 | 16 | .93 | .25 | .39 | 1.41 |
| | > 150 | 11 | .86 | .20 | .68 | 1.39 | 13 | .91 | .26 | .51 | 1.31 |

Table 4.12 (Continued)

| | | CHEM/TEC4 | | | | | FRMF/TEC4 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Site | TEC4 Interval $\mu g/m^3$ | Sample Size | Mean | Std. Dev. | Low | High | Sample Size | Mean | Std. Dev. | Low | High |
| 841 | 0- 60 | 1 | 1.48 | 0 | 1.48 | 1.48 | 2 | 1.39 | .23 | 1.23 | 1.55 |
| | 60- 90 | 40 | 1.21 | .38 | .61 | 2.04 | 44 | 1.12 | .43 | .37 | 2.33 |
| | 90-120 | 24 | .97 | .24 | .60 | 1.54 | 20 | .88 | .17 | .56 | 1.28 |
| | 120-150 | 8 | .96 | .18 | .61 | 1.14 | 6 | .74 | .19 | .44 | 1.04 |
| | > 150 | 7 | .91 | .23 | .55 | 1.13 | 8 | .79 | .18 | .44 | 1.00 |
| 832D | 0- 60 | 0 | | | | | 0 | | | | |
| | 60- 90 | 29 | 1.14 | .33 | .59 | 1.68 | 33 | 1.58 | .72 | .65 | 4.43 |
| | 90-120 | 11 | 1.03 | .17 | .77 | 1.43 | 10 | 1.30 | .40 | .84 | 2.08 |
| | 120-150 | 7 | 1.09 | .08 | 1.00 | 1.24 | 6 | .83 | .24 | .52 | 1.23 |
| | > 150 | 7 | 1.19 | .14 | 1.06 | 1.48 | 7 | .92 | .25 | .57 | 1.22 |

[1] The statistics in this table are shown for descriptive purposes only. Their general use is not recommended (see Section 5.4).

CHRO reading). The table gives (by site and interval) the sample size, mean of the ratios, standard deviation of the ratios and the low and high value of the ratio. The table shows, for all four pairs of methods, that there were only a small number of observations in the two intervals 120-150 and >150. Thus, for these two intervals no conclusions about the ratios could be made. For the other three intervals (0-60, 60-90 and 90-120), it is clear that in most cases the mean of the ratios and the standard deviation of the ratios decreases for the higher concentration intervals. EPA has indicated that the decrease in the mean of the ratios may be caused by a variable collection efficiency for some of the bubbler methods (FRMF, CHESSO). However, another (or an additional) explanation of why these ratios decrease with increasing levels is plausible. Suppose a high correlation exists for two methods (say, method X and method Y). This indicates that a linear relationship ($Y = A + BX$) between the methods is appropriate. Hence, the ratio Y/X would be related to X by

$$\frac{Y}{X} = \frac{A}{X} + B.$$

Thus, if $A > 0$, the ratio Y/X will decrease with increasing X (or X intervals).[1] An indication that this explanation of the decreasing ratio pattern is reasonable is the fact that similar decreasing patterns are some-times evidenced for the continuous methods (for which the question of a variable collection efficiency is apparently not relevant). It is interesting to note from Table 4.12, for example, that (except for site 832) the CHEM/TEC4 ratios also exhibit this decreasing pattern. In any event, the table clearly indicates that the mean of the ratios cannot be assumed constant over the intervals.

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[1] If the relationship is of an alternative form, $Y = CX^D$ (i.e., linear on a log scale), then the ratio will be constant for different levels of X only if $D = 1$.

### c. Estimated Relationships Between Pairs of Methods (Daily Data)

As previously mentioned, a high correlation between a pair of methods means that it is sufficient to characterize such a pair with a linear relationship. In this subsection it is assumed that, for each site, the functional relationship between two methods (method X and method Y) for the $i^{th}$ sampling period, is linear, i.e.,

$$(4.1) \qquad Y_i = \alpha + \beta X_i + \varepsilon_i \quad (i = 1,2,\ldots,N).$$

In this model, $\alpha$ and $\beta$ represent parameters to be estimated and

$Y_i$ = $NO_2$ reading in $\mu g/m^3$ by method Y for the $i^{th}$ day (or 24-hour sampling period),

$X_i$ = $NO_2$ reading in $\mu g/m^3$ by method X for the corresponding period, and

$\varepsilon_i$ = (random) deviation for the $i^{th}$ day.

To estimate the parameters $\alpha$ and $\beta$ by a conventional least squares technique (i.e., minimize $\sum_{i=1}^{N}(Y_i - \alpha - \beta X_i)^2$) would typically require the following assumptions:

(a) the $\varepsilon$'s have mean 0 and the same variance $\sigma^2$ for all i, i.e., $E(\varepsilon_i^2) = \sigma^2$ for all i,

(b) the $\varepsilon$'s are uncorrelated, i.e., Cov $(\varepsilon_i, \varepsilon_j) = 0$ for $i \neq j$, and

(c) the independent variable X is measured without error.

For the current $NO_2$ daily data, assumption (a) does not appear to pose a serious problem, although for some methods (e.g., FRMF, CHESSO) the variation does tend to be somewhat larger for higher $NO_2$ concentration levels. To investigate the failure of assumption (a) RTI has used a logarithmic (log) transformation to stabilize the variance of the concentrations and then determined linear relationships between the log concentrations of pairs of methods. These relationships are given in Appendix Table D-1. However, investigation of the two types of estimated linear relationships (i.e., with and without taking logarithms) showed that, over the range of the current data, the two types of relationships were quite similar, indicating that the departure from assumption (a) was not of practical significance for the current $NO_2$ data. Assumption (b) can be satisfied if the 24-hour averaging period is a sufficiently long period of time to negate short-term meteorological, industrial, and traffic fluctuations. Assumption (c), however, cannot be satisfied.

In the presence of error in the independent variable X of equation (4.1), the ordinary least squares approach yields biased estimates for the parameters $\alpha$ and $\beta$. The estimates $\alpha$ and $\beta$ tend to over- and underestimate the parameters $\alpha$ and $\beta$, respectively, when X and Y are positively correlated. That is, the line fitted by the least squares procedure tends to be too flat. In addition, if one regards the X as the independent variable (as in equation (4.1)) and solves this equation for X, one will obtain an equation which is inconsistent with that obtained by regarding the X as the dependent, and the Y as the independent, variate.

Hence, when both variables are subject to error, an alternative to the ordinary regression technique is desirable for estimating the parameters of model (4.1). Such a procedure for determining a relationship between the methods is that of "orthogonal regression," also known as principal component analysis. This procedure deals with the pair (X,Y) where neither X nor Y is fixed. The technique involves the determination of that linear combination of X and Y, after translation of the origin to the mean $(\overline{X,Y})$, which has maximum variability. This first principal component is given by

$$(4.2) \qquad z_1(X,Y) = m_1(X-\overline{X}) + m_2(Y-\overline{Y})$$

where

$$m_1^2 + m_2^2 = 1.$$

Orthogonal to $z_1$ is the "residual" component

$$(4.3) \qquad z_2(X,Y) = -m_2(X-\overline{X}) + m_1(Y-\overline{Y}).$$

The axis of the first principal component (i.e., $z_2 = 0$) expressed in terms of X and Y provides the best linear characterization of the bivariate data in the sense that the sum of squares of the orthogonal residual components,

$\sum_{i=1}^{N} z_{2i}^2$, is minimized (See Figure 4.1). Setting $z_2 = 0$ in equation (4.3) thus provides an estimated relationship between the methods of the form

$$(4.4) \qquad Y = A + BX$$

where

$$B = \frac{m_2}{m_1} = \frac{2\sum_{i=1}^{N} (X_i-\overline{X})\ (Y_i-\overline{Y})}{\sum_{i=1}^{N} (X_i-\overline{X})^2 - \sum_{i=1}^{N} (Y_i-\overline{Y})^2 + D}$$

$$D = \sqrt{\left[\sum_{i=1}^{N} (X_i-\overline{X})^2 - \sum_{i=1}^{N} (Y_i-\overline{Y})^2\right]^2 + 4\left[\sum_{i=1}^{N} (X_i-\overline{X})\ (Y_i-\overline{Y})\right]^2}$$

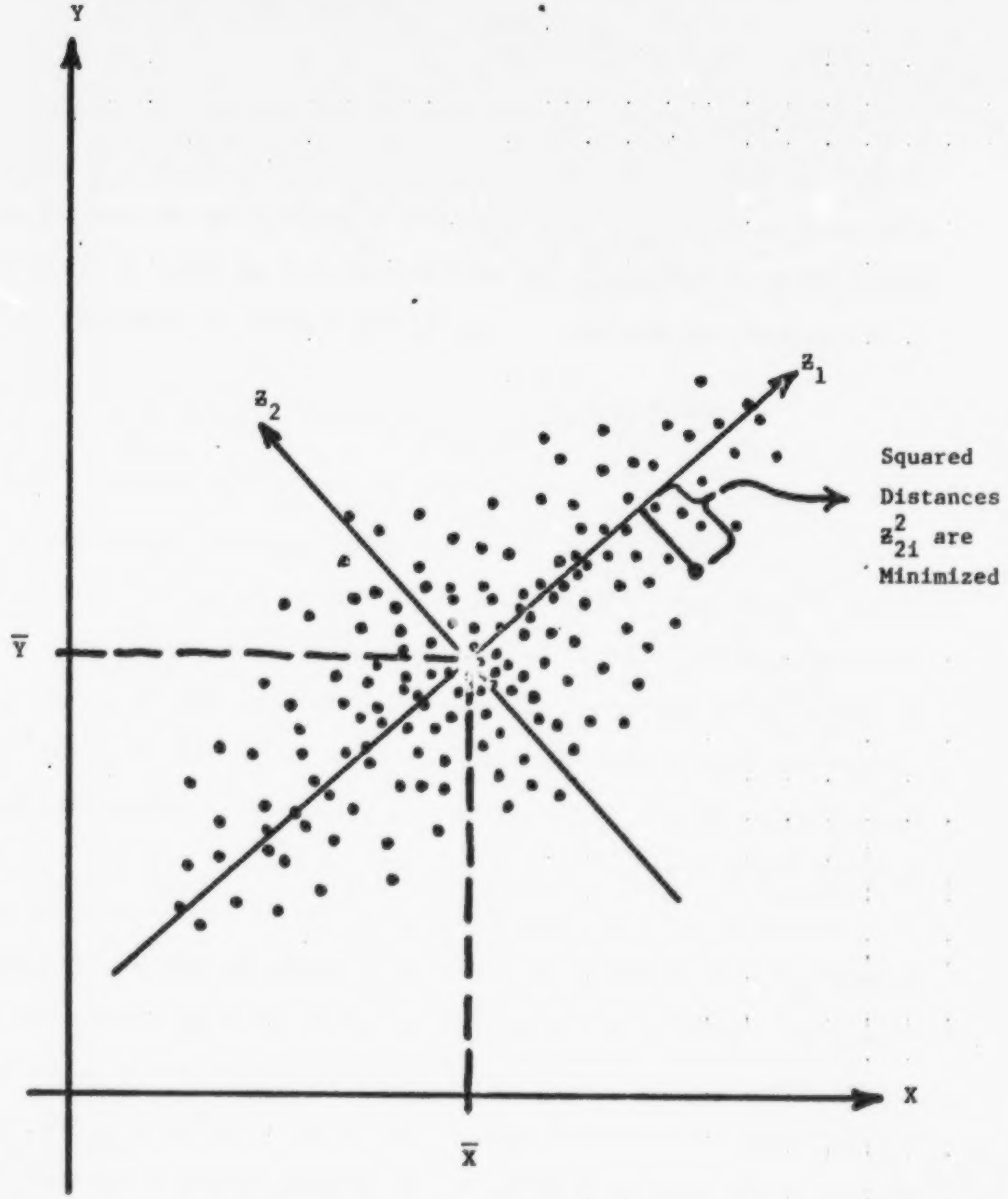
$$A = \overline{Y} - B\overline{X}.$$

Of course, an estimated relationship of the form (4.4) should be used only in the X- and Y- ranges where data is available. If X and Y have a bivariate normal distribution, then an ellipse (centered at $(\overline{X},\overline{Y})$) given by the equation

$$(4.5) \qquad \frac{z_1^2}{\mathrm{Var}(z_1)} + \frac{z_2^2}{\mathrm{Var}(z_2)} = 4$$

will contain roughly 95% of the bivariate sample points. Recommended ranges for which (4.4) holds can therefore be obtained by substituting $z_2 = 0$ into equation (4.5) to give

Figure 4.1 Orthogonal Regression


Y
$z_1$
$z_2$
Squared
Distances
$z_{2i}^2$ are
Minimized
$\overline{Y}$
X
$\overline{X}$

(4.6) $\hat{z}_1 = \pm\, 2\sqrt{\mathrm{Var}(\hat{z}_1)}$.

It should be pointed out here that if the correlation between X and Y is high, then $\mathrm{Var}(\hat{z}_1)$ will be much larger than $\mathrm{Var}(\hat{z}_2)$, i.e., the ellipse will be quite elongated. This degree of elongation (or of adequacy of the fitted linear relationship) can also be expressed in terms of the percentage of the variability accounted for by the first principal component ($\hat{z}_1$):

(4.7) $$\mathrm{PCV1} = \frac{\mathrm{Var}(\hat{z}_1)}{\mathrm{Var}(\hat{z}_1) + \mathrm{Var}(\hat{z}_2)} \times 100\%.$$

The orthogonal regression approach has the appeal that a single, consistent linear relationship between X and Y is determined--and without making the unrealistic assumption that one of the variables is measured without error. The problems involved with the standard regression approach when both variates involve error is discussed, for example, by Berkson [2]. A graphic description of the "orthogonal regression" technique is given by Hald [9]. Further discussion of procedures for determining relationships between the methods is given in Appendix D.

Because of the discussion given above, RTI felt that the relationships between pairs of methods as given in (4.1) should be obtained by orthogonal regression; accordingly, the results of using orthogonal regression are given in the present section. Results of using alternative models to (4.1) (i.e., linear in the logarithms of X and Y) and using conventional (ordinary) regression are given in Appendix D. In addition Appendix D gives the statistics necessary to compute confidence limits on the conventional regression lines.

The parameter estimates A and B of equation (4.4), in conjunction with the recommended ranges over which the linear relationships are applicable, are given in Appendix Table C-1 for each site and each pair of methods. The following remarks and notation are needed to use this table:

(1) The first line of each set represents the overall results obtained by combining the data from the seven sites (Site 832D excluded).

(2) X corresponds to method 1 and Y to method 2; hence,

N = number of (paired) observations
M1 = $\overline{X}$ = mean for first method
M2 = $\overline{Y}$ = mean for second method
SD1 = standard deviation for first method
SD2 = standard deviation for second method
COR = correlation between X and Y
Y = A + BX is the form of the estimated relationship obtained by orthogonal regression
PCV1 = the percentage of variability accounted for by the first principal component (see equation (4.7))
RATIO = M2/M1 = $\overline{Y}/\overline{X}$ = ratio of means
(M1LOW, M1HIGH) = recommended range for method 1 over which the estimated relationship is applicable (see equation (4.6))
(M2LOW, M2HIGH) = same for method 2

Examination of Appendix Table C-1 leads to the following question: For a particular pair of methods, is a separate linear relationship needed for every site? If ordinary regression is used and statistical tests of significance are performed to determine if these regressions differ from site-to-site, one concludes that they do in fact differ in almost all cases. However, if one ignores sites (i.e., as in the overall regression), a strong linear trend is still evident. This is indicated by the correlations between X and Y for the combined data. In many cases, these correlations are higher than the corresponding correlations for the individual sites. Scatter diagram plots such as those shown in Figures 4.2 and 4.3 also indicate that, from a practical point of view, the combining of data over sites is justified.[1] The regressions indicated in Appendix Table C-1 are presented graphically in Appendix Figures C-1 through C-36. The figures only plot regressions based on more than 30 observations and exclude site 832D (recall that the data from site 832D was not included in the overall regressions).

The 36 graphs shown in Appendix C indicate that a single overall linear regression is usually satisfactory for characterizing the relationship between a particular pair of methods, i.e., separate relation-

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[1] Figures 4.2 and 4.3 also indicate that the same linear equation will describe the data over its range as well as (or better than) breaking the data into intervals and fitting separate linear equations within intervals.

Figure 4.2

Scatter Plot of CHRO vs. CHEM--Over Sites

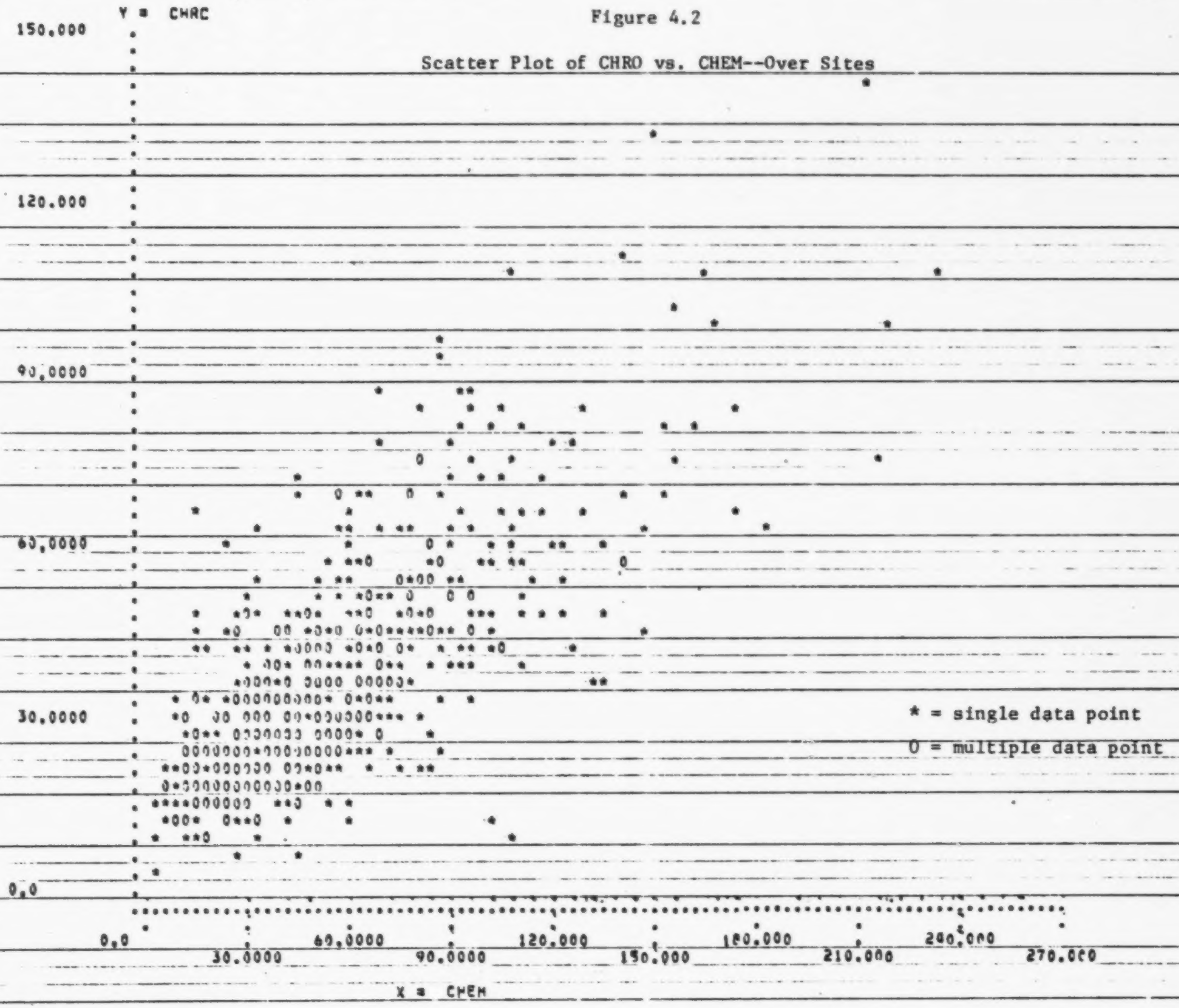
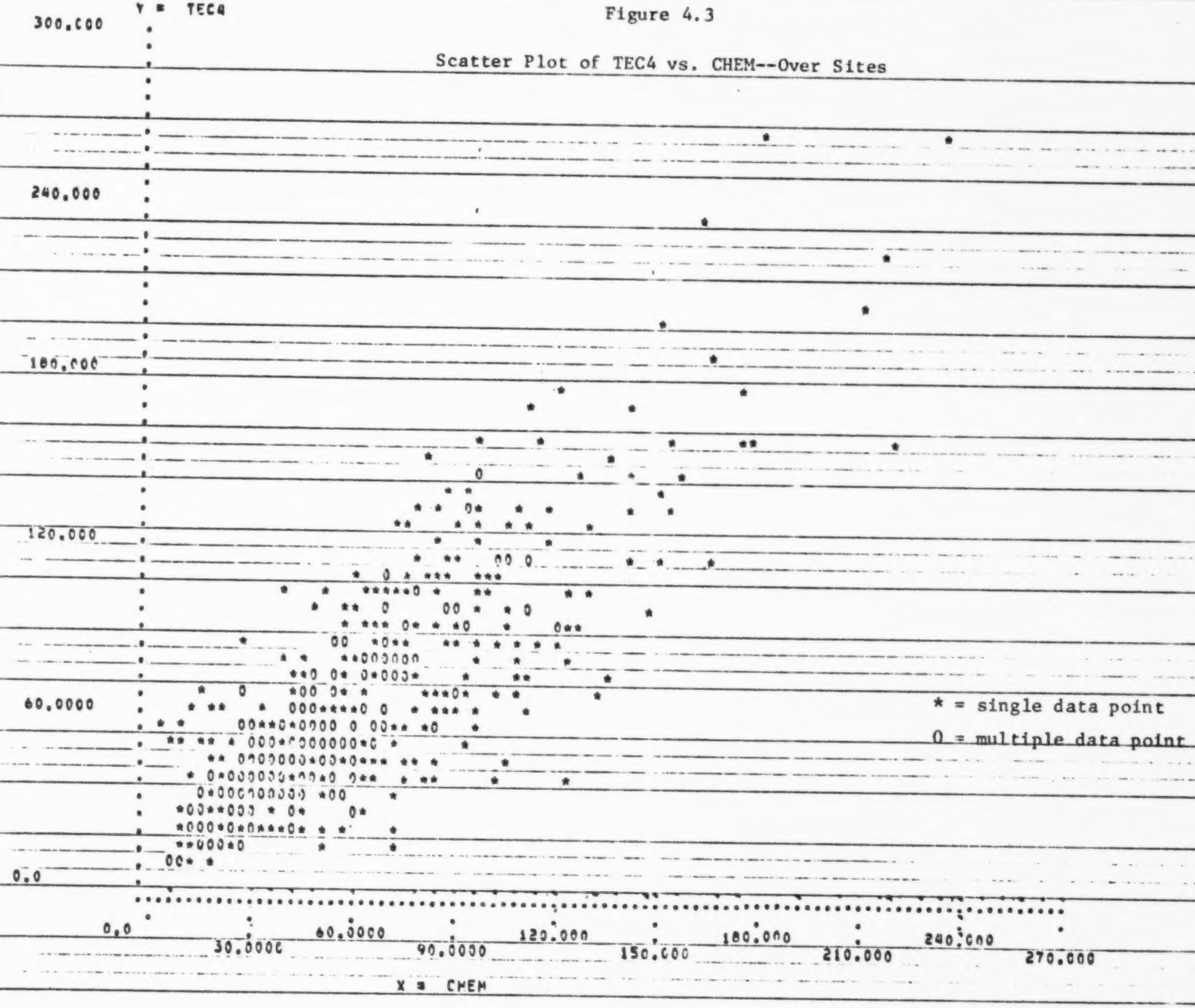


Figure 4.3

Scatter Plot of TEC4 vs. CHEM--Over Sites



ships are not needed for every site. Accordingly, Table 4.13 gives, for each pair of methods, the parameter estimates A and B for the estimated relation (4.4). These estimates were determined by using the orthogonal regression approach on the pooled data from the seven sites (excluding 832D). The table also gives other pertinent summary statistics and recommended ranges of applicability for the regressions. The notation used is the same as that previously described for Appendix Table C-1. Some of the relationships indicated by Table 4.13 are portrayed graphically in Figures 4.4 and 4.5. The first figure shows the estimated relationships between the CHEM and seven other methods.[1] Figure 4.5 shows similar plots for the CHRO. Based on these two figures and the results shown in Table 4.13, one can draw the following general conclusions:

1. The two continuous monitors, CHEM and TEC4, are well correlated (0.827) and agree in magnitude reasonably well, although the TEC4 may run slightly higher.
2. The CHESSO method correlates poorly (0.596) with the CHEM; in general it gives readings somewhat smaller than the CHEM.
3. Five of the bubblers (i.e., FRMF, TEAF, CHRF, CHRO, TGSO) have correlations of about 0.7 to 0.8 with the

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[1] The TECH is excluded since it is present at only two stations.

Table 4.13 Estimated Relationships Between Methods[1]

Based on the Combined Data Over Sites[2]

| METH1 | METH2 | N | COR | A | B | PCV1 | M1LOW[3] | M1HIGH | M2LOW | M2 |
|---|---|---|---|---|---|---|---|---|---|---|
| FRMF | TEAF | 1290 | .809 | 2.0038 | 0.47865 | 93.5 | 0.0 | 151.2 | 1. | 74. |
| FRMF | CHRF | 1337 | .773 | 4.5189 | 0.58082 | 90.7 | 0.0 | 153.8 | 4.2 | 93. |
| FRMF | CHRO | 1313 | .787 | 4.7961 | 0.55405 | 91.7 | 0.0 | 152.1 | 4.7 | 89.1 |
| FRMF | CHESSO | 1166 | .594 | -2.4402 | 0.75857 | 80.4 | 1.6 | 149.6 | 0.0 | 111. |
| FRMF | TGSO | 648 | .689 | -1.1686 | 0.49813 | 88.3 | 0.0 | 161.8 | 0.0 | 79.4 |
| FRMF | TECH | 265 | .549 | -9.9188 | 1.18309 | 77.7 | 12.0 | 100.0 | 4.2 | 108.4 |
| FRMF | TEC4 | 637 | .713 | -14.1319 | 1.04755 | 85.7 | 1.4 | 143.7 | 0.0 | 136.4 |
| FRMF | CHEM | 648 | .687 | -1[illegible].4000 | 0.93014 | 84.4 | 3.8 | 140.3 | 0.0 | 120.1 |
| TEAF | CHRF | 1310 | .846 | 0.5442 | 1.25673 | 92.6 | 0.0 | 76.9 | 0.0 | 97.2 |
| TEAF | CHRO | 1285 | .858 | 2.4597 | 1.15771 | 93.0 | 0.0 | 77.0 | 1.2 | 91.6 |
| TEAF | CHESSO | 1141 | .613 | -22.4750 | 2.04057 | 85.0 | 6.3 | 68.4 | 0.0 | 117.2 |
| TEAF | TGSO | 625 | .762 | -5.5566 | 1.13143 | 88.2 | 0.0 | 78.1 | 0.0 | 82.8 |
| TEAF | TECH | 266 | .729 | -17.2975 | 2.63888 | 92.4 | 6.4 | 49.8 | 0.0 | 114.0 |
| TEAF | TEC4 | 619 | .757 | -19.2612 | 2.19319 | 91.9 | 3.4 | 67.8 | 0.0 | 129.4 |
| TEAF | CHEM | 635 | .757 | -18.1422 | 2.03941 | 91.3 | 3.4 | 68.4 | 0.0 | 121.3 |

Table 4.13 (Continued)

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CHRF | CHRO | 1326 | .927 | 1.2385 | 0.93297 | 96.4 | 0.0 | 99.4 | 0.0 | 94.0 |
| CHRF | CHESSO | 1184 | .620 | -20.3687 | 1.56150 | 82.8 | 7.4 | 89.3 | 0.0 | 119.1 |
| CHRF | TGSO | 650 | .805 | -7.6510 | 0.98116 | 90.2 | 0.0 | 95.1 | 0.0 | 85.7 |
| CHRF | TECH | 268 | .709 | -25.8400 | 2.58627 | 91.6 | 9.9 | 54.1 | 0.0 | 114.0 |
| CHRF | TEC4 | 655 | .715 | -24.7639 | 1.87449 | 88.8 | 4.9 | 87.9 | 0.0 | 140.0 |
| CHRF | CHEM | 663 | .729 | -19.0056 | 1.60937 | 88.2 | 4.6 | 89.8 | 0.0 | 125.5 |
| CHRO | CHESSO | 1169 | .590 | -23.7845 | 1.69291 | 82.0 | 9.2 | 83.3 | 0.0 | 117.3 |
| CHRO | TGSO | 633 | .790 | -9.7597 | 1.04031 | 89.5 | 1.4 | 91.7 | 0.0 | 85.6 |
| CHRO | TECH | 270 | .678 | -29.7785 | 2.66998 | 90.7 | 11.0 | 53.7 | 0.0 | 113.7 |
| CHRO | TEC4 | 643 | .752 | -26.6239 | 2.01044 | 91.0 | 5.3 | 82.6 | 0.0 | 139.4 |
| CHRO | CHEM | 650 | .737 | -21.0308 | 1.73832 | 89.2 | 5.6 | 83.5 | 0.0 | 124.1 |
| CHESSO | TGSO | 556 | .496 | 10.6553 | 0.46470 | 79.9 | 0.0 | 131.1 | 5.6 | 71.6 |
| CHESSO | TECH | 261 | .292 | -53.7663 | 3.10822 | 73.2 | 16.6 | 53.4 | 0.0 | 112.2 |
| CHESSO | TEC4 | 635 | .646 | -0.7229 | 1.23363 | 82.7 | 0.0 | 111.5 | 0.0 | 136.8 |
| CHESSO | CHEM | 645 | .596 | -4.7070 | 1.19481 | 80.1 | 0.0 | 109.8 | 0.0 | 126.5 |

Table 4.13 (Continued)

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TGSO | TECH | 191 | .538 | -22.6463 | 2.73142 | 85.1 | 7.3 | 50.4 | 0.0 | 114.9 |
| TGSO | TEC4 | 302 | .723 | -21.8427 | 2.22101 | 90.7 | 0.0 | 80.6 | 0.0 | 157.2 |
| TGSC | CHEM | 351 | .730 | -7.5240 | 1.80081 | 89.1 | 0.0 | 73.8 | 0.0 | 125.0 |
| TECH | TEC4 | 227 | .560 | 12.7391 | 0.53795 | 81.5 | 0.0 | 118.4 | 12.7 | [illegible] |
| TECH | CHEM | 222 | .643 | 9.5804 | 0.61950 | 84.2 | 0.0 | 114.7 | 8.0 | 80.6 |
| TEC4 | CHEM | 545 | .827 | 1.4387 | 0.92066 | 91.4 | 0.0 | 139.1 | 0.0 | 129.5 |

[1/] The estimated relationship is of the form Meth 2 = A + B (Meth 1). The statistics in this table are shown for descriptive purposes only. Their general use is not recommended (see Section 5.4).

[2/] Over sites 632, 633, 901, 902, 831, 832 and 841.

[3/] M1LOW, M1HIGH = recommended range for method 1 over which the estimated relationship holds; M2LOW, M2HIGH = same for method 2.

NOTE: If M1LOW or M2LOW was negative it was set at 0 μg/$m^3$.

Figure 4.4

Estimated Relationships Between the CHEM and

Seven Other Monitoring Methods

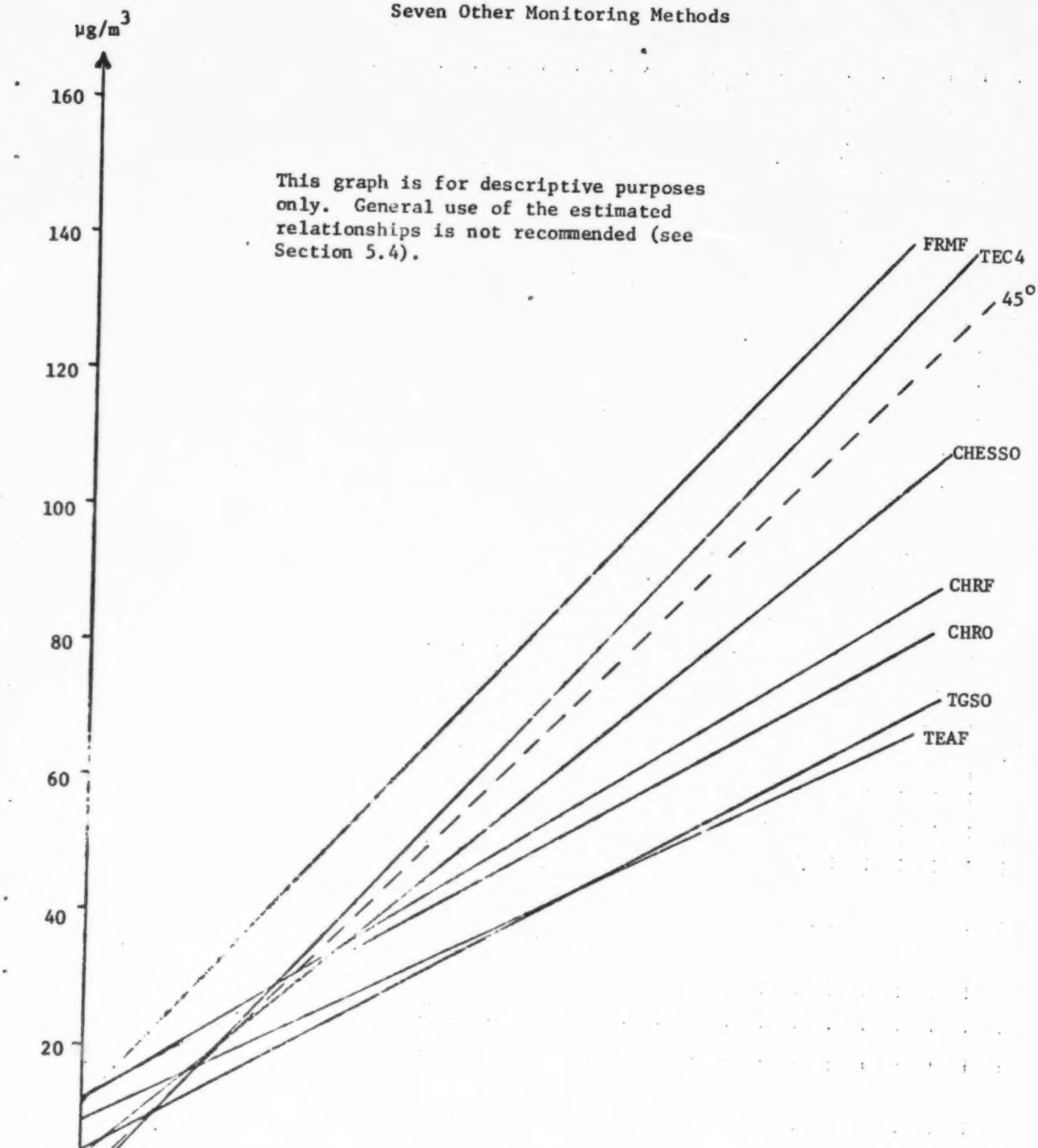
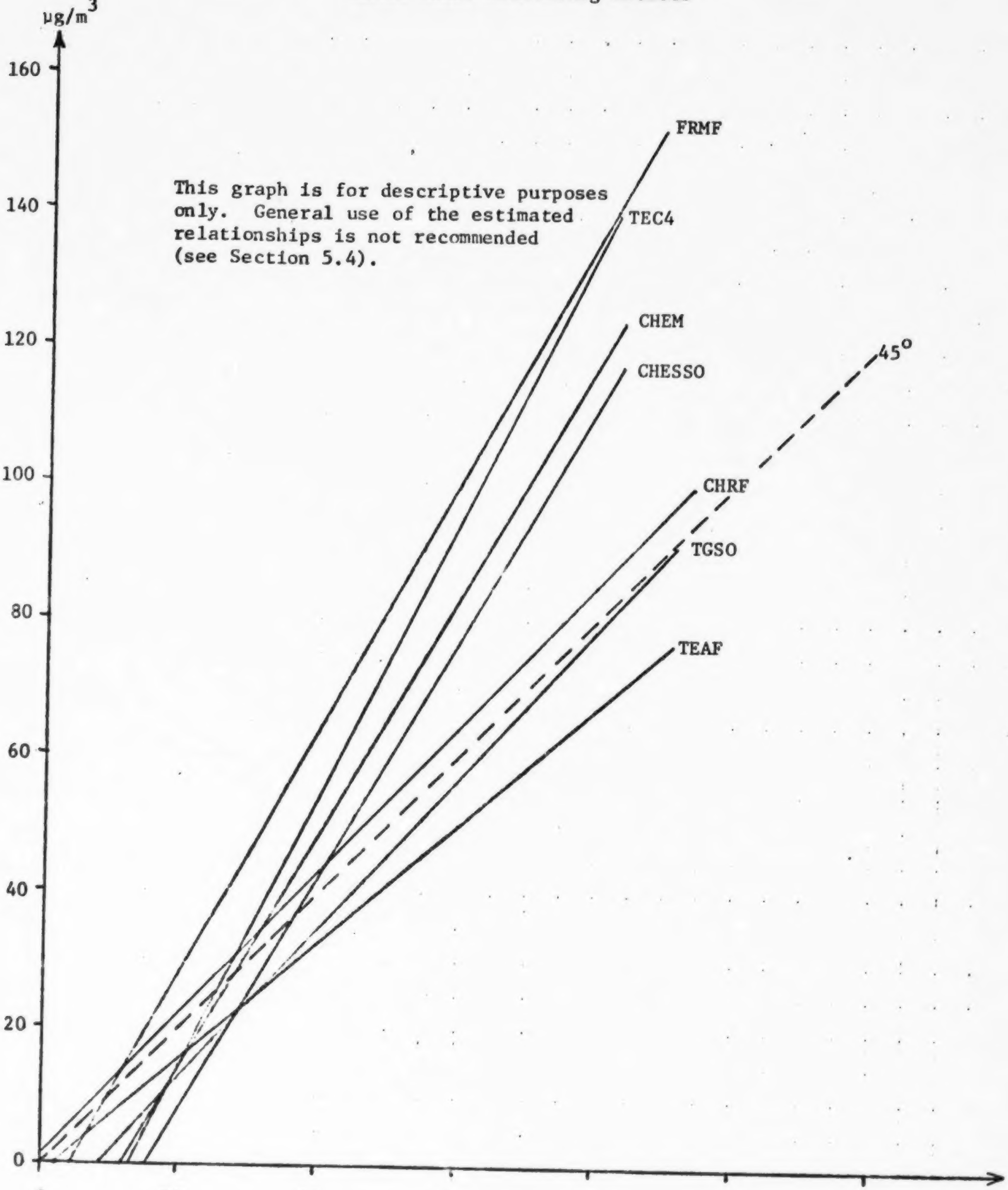


Figure 4.5

Estimated Relationships Between the CHRO and

Seven Other Monitoring Methods



CHEM and the TEC4. The FRMF gives larger readings than the TEC4 and CHEM methods whereas these other four NASN bubblers tend to produce lower readings than the continuous monitors.

4. The CHRO has high correlations with the other NASN bubblers (especially with the CHRF). In the range of practical interest, the FRMF produces readings much higher than the CHRO; the CHRF and TGSO tend to agree with the CHRO, whereas the TEAF tends to be lower, (recall a 100% collection efficiency was assumed for the TEAF in this report).
5. The TEC4, CHEM, and CHESSO run higher than the CHRO method; the CHESSO correlation with the CHRO is only 0.59.

d. Summary Statistics for Unpaired Data

As mentioned previously, comparisons between unpaired data for the various monitoring methods can be misleading because of the large amount of missing $NO_2$ daily data. Thus, the purpose of the present subsection is only to give a rough indication of the relative magnitudes of summary statistics for the various methods. Table 4.14 presents arithmetic means by site and method for the unpaired data. The table shows the approximate ranking (over sites, from largest to smallest) of the means to be TECH, FRMF, TEC4, CHEM, CHESSO, CHRF, CHRO, TGSO and TEAF. Of course, the

### Table 4.14

### Means of Daily Measurements by Method and Site, Unpaired Data

| | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSO | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| Chattanooga | | | | | | | | | |
| 632 | 55.9 | 28.2 | 34.5 | 34.4 | 33.3 | 27.2 | 52.5 | 45.7 | 41.8 |
| 633 | 53.4 | 25.3 | 33.6 | 32.3 | 33.5 | 29.4 | 61.7 | 40.6 | 37.9 |
| St. Louis | | | | | | | | | |
| 901 | 89.9 | 43.2 | 58.5 | 54.9 | 71.4 | 41.5 | * | 63.4 | 78.1 |
| 902 | 73.5 | 35.6 | 44.1 | 42.4 | 56.7 | 31.6 | * | 47.5 | 45.9 |
| California | | | | | | | | | |
| 831[1/] | 73.0 | 44.5 | 56.2 | 51.9 | 55.4 | 68.6 | * | 79.9 | 69.4 |
| 832 | 113.9 | 54.0 | 67.6 | 64.6 | 76.4 | 57.5 | * | 99.3 | 84.4 |
| 841 | 78.5 | 45.7 | 57.0 | 57.7 | 64.7 | 46.9 | * | 90.1 | 87.4 |
| 832D | 111.7 | 64.5 | 80.1 | 73.2 | 85.5 | 64.4 | * | 90.0 | 100.9 |

* = No data present

[1/] On October 6, 1972, all methods except CHESSO and CHEM moved from site 831 to site 832.

assumed collection efficiencies for the various bubblers undoubtedly affect this ranking a great deal. The relative magnitudes of the means given in Table 4.14 are approximately the same as shown earlier for the paired data (Sections 4.4.b and 4.4.c). Table 4.14 also shows that, in general, the sites in Chattanooga have the lowest $NO_2$ readings and the sites in California have the highest $NO_2$ readings. Site 832 (or 832D) generally has the highest readings of the sites sampled.

Table 4.15 presents frequency distributions and summary statistics for the various methods over the seven sites. (The TECH method is not given in the table since it only occurs in sites 632 and 633). For each method the table gives sample sizes, arithmetic means, standard deviations, geometric means, standard deviations of logarithms, as well as the minimum, median and maximum values. The statistics given in Table 4.15 are shown chiefly to provide one with an idea of the location, scale and skewness of the distributions for the individual methods (for data combined over sites). The table shows the arithmetic mean of each method is greater than its median which indicates that the distribution of each method is skewed. This skewness can also be seen in Figure 4.6 which gives histograms (corresponding to the frequency distributions) for each method. The forms of these distributions are dependent, of course, on the particular sites involved (i.e., one would not necessarily expect any one site or any other collection of sites to give the same distributions). Tables showing the frequency distributions and (unpaired) summary statistics for the individual sites are given

Table 4.15

SUMMARY STATISTICS NO2 MONITORING METHODS COMPARISON -- SEVEN SITES COMBINED[1], Unpaired Data

| VARIABLE | NO. OBS. | <= 15. | 15.- 30. | 30.- 45. | 45.- 60. | 60.- 75. | 75.- 90. | 90.-105. | 105.-120. | 120.-135. | 135.-150. | 150.- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  | FREQUENCY DISTRIBUTION |  |  |  |  |  |  |  |  |  |  |
| FRMF | 1404 | 0.85 | 6.41 | 12.54 | 16.74 | 19.59 | 14.74 | 10.04 | 7.55 | 4.06 | 2.28 | 5.20 |
|  |  | 0.85 | 7.26 | 19.80 | 36.54 | 56.13 | 70.87 | 80.91 | 88.46 | 92.52 | 94.80 | 100.00 |
| TEAF | 1367 | 7.68 | 32.92 | 30.36 | 16.75 | 6.95 | 2.85 | 1.39 | 0.37 | 0.66 | 0.0 | 0.07 |
|  |  | 7.68 | 40.60 | 70.96 | 87.71 | 94.66 | 97.51 | 98.90 | 99.27 | 99.93 | 99.93 | 100.00 |
| CHRF | 1426 | 3.02 | 20.13 | 27.21 | 22.51 | 13.74 | 6.17 | 3.65 | 1.96 | 0.84 | 0.49 | 0.28 |
|  |  | 3.02 | 23.14 | 50.35 | 72.86 | 86.61 | 92.78 | 96.42 | 98.39 | 99.23 | 99.72 | 100.00 |
| CHRC | 1395 | 3.30 | 21.86 | 29.10 | 22.51 | 11.54 | 6.24 | 2.87 | 1.29 | 0.79 | 0.22 | 0.[illegible] |
|  |  | 3.30 | 25.16 | 54.27 | 76.77 | 88.32 | 94.55 | 97.42 | 98.71 | 99.50 | 99.71 | 100.00 |
| CHESSC | 1479 | 4.67 | 19.68 | 22.74 | 17.58 | 13.12 | 8.99 | 5.61 | 2.70 | 2.16 | 0.54 | 2.16 |
|  |  | 4.67 | 24.34 | 47.13 | 64.71 | 77.82 | 86.82 | 92.43 | 95.13 | 97.30 | 97.84 | 100.00 |
| TGSC | 684 | 6.14 | 38.45 | 28.22 | 13.01 | 6.29 | 2.19 | 2.34 | 2.05 | 0.44 | 0.29 | 0.58 |
|  |  | 6.14 | 44.59 | 72.81 | 85.82 | 92.11 | 94.30 | 96.64 | 98.68 | 99.12 | 99.42 | 100.00 |
| TECO | 748 | 2.14 | 14.04 | 22.73 | 20.99 | 12.17 | 8.82 | 6.28 | 4.95 | 2.54 | 1.74 | 3.61 |
|  |  | 2.14 | 16.18 | 38.90 | 59.89 | 72.06 | 80.88 | 87.17 | 92.11 | 94.65 | 96.39 | 100.00 |
| CHEM | 832 | 4.45 | 16.95 | 22.24 | 18.39 | 13.82 | 8.05 | 6.01 | 3.37 | 2.16 | 1.32 | 3.25 |
|  |  | 4.45 | 21.39 | 43.63 | 62.02 | 75.84 | 83.89 | 89.90 | 93.27 | 95.43 | 96.75 | 100.00 |

| VARIABLE | NO. OBS. | MIN. VALUE | MEDIAN VALUE | MAX. VALUE | ARITH. MEAN | GEOM. MEAN | STD. DEV. | STD.D. OF LNS |
|---|---|---|---|---|---|---|---|---|
| FRMF | 1404 | 7.3000 | 69.7000 | 385.8999 | 76.7252 | 67.4902 | 39.1902 | 0.5277 |
| TEAF | 1367 | 1.3000 | 34.5000 | 200.5000 | 38.1790 | 33.2036 | 20.6039 | 0.5495 |
| CHRF | 1426 | 2.7059 | 44.4706 | 237.1765 | 49.3297 | 43.2044 | 25.5848 | 0.5358 |
| CHRC | 1395 | 1.2941 | 43.0588 | 240.3529 | 47.1961 | 41.5635 | 24.0458 | 0.5252 |
| CHESSC | 1479 | 3.5000 | 46.7000 | 303.5999 | 55.0106 | 45.6714 | 34.7290 | 0.6310 |
| TGSC | 684 | 1.2000 | 32.5000 | 179.7000 | 39.1128 | 33.0266 | 24.9946 | 0.5888 |
| TECO | 748 | 8.1000 | 52.8000 | 326.2000 | 62.9463 | 52.6129 | 40.2057 | 0.5963 |
| CHEM | 832 | 3.9000 | 49.7000 | 234.8000 | 58.2721 | 48.2615 | 36.4557 | 0.6388 |

---

[1] Combined over sites 632, 633, 901, 902, 831, 832 and 841 (832D omitted).

### Histograms by Method--Seven Sites Combined[1/], Unpaired Data

```
HISTOGRAM FOR  FRMF          N =  1404

 <=  15 , *
 <=  30 , ******
 <=  45 , *************
 <=  60 , *****************
 <=  75 , ********************
 <=  90 , ***************
 <= 105 , **********
 <= 120 , ********
 <= 135 , ****
 <= 150 , **
  > 150 , *****

HISTOGRAM FOR  TEAF          N =  1367

 <=  15 , ********
 <=  30 , *********************************
 <=  45 , ******************************
 <=  60 , *****************
 <=  75 , *******
 <=  90 , ***
 <= 105 , *
 <= 120 , *
 <= 135 , *
 <= 150 ,
  > 150 , *

HISTOGRAM FOR  CHRF          N =  1426

 <=  15 , ***
 <=  30 , ********************
 <=  45 , ***************************
 <=  60 , ***********************
 <=  75 , **************
 <=  90 , ******
 <= 105 , ****
 <= 120 , **
 <= 135 , *
 <= 150 , *
  > 150 , *

HISTOGRAM FOR  CHRG          N =  1395

 <=  15 , ***
 <=  30 , **********************
 <=  45 , *****************************
 <=  60 , ***********************
 <=  75 , ************
 <=  90 , ******
 <= 105 , ***
 <= 120 , *
 <= 135 , *
 <= 150 , *
  > 150 , *
```

Figure 4.6 (Continued)

```
HISTCGRA  OR CHESSO          N =  1479

 <=  15 , >  ***
 <=  30 , ********************
 <=  45 , ***********************
 <=  60 , ******************
 <=  75 , *************
 <=  90 , *********
 <= 105 , ******
 <= 120 , ***
 <= 135 , **
 <= 150 , *
  > 150 , **

HISTCGRAM FOR  TGSC          N =   684

 <=  15 , ******
 <=  30 , **************************************
 <=  45 , ****************************
 <=  60 , *************
 <=  75 , ******
 <=  90 , **
 <= 105 , **
 <= 120 , **
 <= 135 , *
 <= 150 , *
  > 150 , *

HISTCGRAM FOR  TEC4          N =   748

 <=  15 , **
 <=  30 , **************
 <=  45 , ***********************
 <=  60 , *********************
 <=  75 , ************
 <=  90 , *********
 <= 105 , ******
 <= 120 , *****
 <= 135 , ***
 <= 150 , **
  > 150 , ****

HISTCGRAM FOR  CHEM          N =   832

 <=  15 , ****
 <=  30 , *****************
 <=  45 , **********************
 <=  60 , ******************
 <=  75 , **************
 <=  90 , ********
 <= 105 , ******
 <= 120 , ***
 <= 135 , **
 <= 150 , *
  > 150 , ***
```

1/ Combined over sites 632, 633, 901, 902, 831, 832 and 841 (832D omitted).

in Appendix A.

### e. Analysis of Duplicate Data for Site 832

Duplicate measurements were made in Site 832 for each of the $NO_2$ monitoring methods (except TECH). The primary reason for obtaining these measurements was to provide a means for estimating and comparing the precision of the various methods. To estimate the precision of a particular method, the following model is assumed:

$$Y_{ij} = (\mu + m) + \delta_i + \gamma_j + \varepsilon_{ij} \qquad (i = 1,2,\ldots,N;\ j = 1,2). \tag{4.8}$$

In (4.8),

$Y_{ij}$ = the observed $NO_2$ reading on the $i^{th}$ day by the $j^{th}$ instrument (or bubbler)[1] of that type,

$\mu$ = true mean $NO_2$,

m = deviation in reading from the true mean due to the particular method (i.e., bias),

$\delta_i$ = deviation in reading due to the effect of the $i^{th}$ day,

$\gamma_j$ = deviation in reading due to the effect of the $j^{th}$ instrument of the given type, and

$\varepsilon_{ij}$ = deviation in reading due to measurement error for the $j^{th}$ instrument on the $i^{th}$ day.

---

[1] The term "instrument" in this section will be used in a general sense referring to any means of measuring $NO_2$.

The three sources of variation (day, instrument, measurement) are all assumed to be random effects (i.e., representative of a much larger population of days, instruments, or measurement deviations) with zero means and with variances $\sigma_D^2$, $\sigma_I^2$, and $\sigma_e^2$. With (4.8) as the underlying model, one prefers a monitoring method which has the following characteristics:

(1) small bias (i.e., $m \approx 0$),

(2) small instrument variation (i.e., small $\sigma_I^2$),

(3) small measurement error (i.e., small $\sigma_e^2$).

With the type of data available for this report, one cannot estimate m, the bias of a method. However, one can remove this bias, as well as the daily $NO_2$ fluctuations so as to obtain estimates of method precision (defined as $\sigma_m^2 = \sigma_I^2 + \sigma_e^2$) and of the measuring error of an instrument ($\sigma_e^2$). Letting $d_i = Y_{i1} - Y_{i2}$ and

$$\bar{d} = \frac{1}{N} \sum_{i=1}^{N} d_i$$

we can estimate the parameters $\sigma_m$ and $\sigma_e$, using (respectively)

$$\hat{\sigma}_m = \sqrt{\frac{1}{2N} \sum_{i=1}^{N} d_i^2} \tag{4.9}$$

and

$$\hat{\sigma}_e = \sqrt{\frac{\sum d_i^2 - N\bar{d}^2}{2(N-1)}} \,. \tag{4.10}$$

Table 4.16 shows the estimates $\hat{\sigma}_m$ and $\hat{\sigma}_e$ for each of the eight methods. Other pertinent summary statistics (paired) are also given. The last

## Table 4.16

## Summary Statistics and Estimates of Precision for Paired Duplicate Data at Site 832[2]

| Method (and Instrument) | No. Paired Observations | MEAN (µg/m$^3$) | Std. Dev. (µg/m$^3$) | Corr. | $\hat{\sigma}_e$[1] (µg/m$^3$) | $\hat{\sigma}_m$ (µg/m$^3$) | P |
|---|---|---|---|---|---|---|---|
| $FRMF_1$ | 127 | 123.3 | 49.7 | 0.74 | 24.6 | 32.3 | 27.3% |
| $FRMF_2$ | | 113.0 | 45.4 | | | | |
| $TEAF_1$ | 111 | 59.0 | 29.4 | 0.89 | 11.4 | 11.9 | 19.4 |
| $TEAF_2$ | | 63.9 | 34.8 | | | | |
| $CHRF_1$ | 149 | 73.1 | 32.2 | 0.87 | 12.8 | 13.6 | 17.8 |
| $CHRF_2$ | | 79.4 | 37.4 | | | | |
| $CHRO_1$ | 121 | 69.8 | 31.2 | 0.84 | 12.7 | 12.9 | 18.0 |
| $CHRO_2$ | | 73.2 | 31.5 | | | | |
| $CHESSO_1$ | 134 | 84.9 | 43.4 | 0.66 | 26.2 | 26.2 | 30.7 |
| $CHESSO_2$ | | 85.6 | 46.4 | | | | |
| $TGSO_1$ | 72 | 60.0 | 31.5 | 0.85 | 12.8 | 13.5 | 21.3 |
| $TGSO_2$ | | 66.5 | 34.0 | | | | |
| $TEC4_1$ | 63 | 93.2 | 48.9 | 0.98 | 7.5 | 9.2 | 10.3 |
| $TEC4_2$ | | 85.4 | 43.4 | | | | |
| $CHEM_1$ | 50 | 85.1[3] | 48.3 | 0.95 | 15.9 | 22.3 | 23.2 |
| $CHEM_2$ | | 107.5 | 62.0 | | | | |

[1] $\hat{\sigma}_m^2 = \hat{\sigma}_e^2 + \hat{\sigma}_I^2$; $\hat{\sigma}_e$, $\hat{\sigma}_I$ and P are defined in the text.

[2] The statistics in this table are shown for descriptive purposes only. Their general use is not recommended (see Section 5.4).

[3] Forty-four of the fifty paired readings for the CHEM showed lower readings for the first instrument ($CHEM_1$). This probably reflects calibration problems since the high correlation between $CHEM_1$ and $CHEM_2$ indicates that equipment malfunctions are not prevalent.

column provides a measure of relative precision for the methods given by

$$P = \frac{2\hat{\sigma}_m}{\bar{Y}_1 + \bar{Y}_2} \times 100\%,$$

where $\bar{Y}_j$ = mean for instrument j over days. Table 4.16 indicates that the measurement error ($\sigma_e^2$) makes up the larger component of the precision for all of the methods. The FRMF, TEC4, and especially the CHEM methods have more instrument variation than the other methods, as shown in the mean column. The last two columns indicate that, among the bubblers, the CHRF, CHRO, and TEAF have better precision. The TEC4 shows the best precision for all methods and the FRMF and CHESSO, the worst. It should be cautioned that these data (and consequently, any conclusions) represent only the single site (832). For example, Appendix Table C-1 shows that standard deviations for the CHEM are quite often lower than those of the TEC4 in other sampling sites.[1/]

---

[1/] RTI also investigated a procedure due to Grubbs for obtaining precision. The Grubbs procedure does not require duplicate measurements on the same method. However, the Grubbs procedure appears to be inappropriate for the current sampling data.

## 4.5 Analysis of Hourly Sampling Data

As described in Section 4.2, appropriately lagged hourly data for the continuously-monitoring instruments were made available to RTI. These data were based on strip chart readings and/or averages of 5-minute readouts from the automated data collection system. Only strip chart readings were available for the TECH (Chattanooga only). Only a rough univariate screening procedure was applied to the hourly data by RTI. In particular, any value (hourly) exceeding 999 $\mu g/m^3$ was dropped. All hourly values below 9 $\mu g/m^3$, including negative and zero values, were converted to 4.7 $\mu g/m^3$. This value represents about 1/2 of what is generally regarded as a minimum detectable concentration[1/]. The analysis of these hourly data consisted of two basic types: an analysis by site, and an analysis by site and hour (i.e., 0000-0100, 0100-0200, etc.). Site 831 has been excluded because of its limited amount of data.

The results of the first analysis are presented in Table 4.17. These results consist of the means, standard deviations, and sample sizes for each method (paired) as well as the correlations between the methods and the ratios of means. The means and ratios compare favorably with the corresponding statistics based on the daily data (see Table C-1 ). As was the case for the daily data, considerable variation in the correlations occurs for the different sites; this variation in the hourly-based correlations appears to be effected for two reasons:

---

[1/] The minimum detectable level of 9 $\mu g/m^3$ has been determined under laboratory conditions, i.e., it assumes the instrument is performing at peak efficiency.

## Table 4.17

## Summary Statistics Based on Paired Hourly Averages by Site[1/]

| SITE | No. Obs. | Means |  | Std. Deviations |  | Corr. | Ratio of Means |
|---|---|---|---|---|---|---|---|
|  |  | CHEM | TEC4 | CHEM | TEC4 |  |  |
| 632 | 2844 | 40.1 | 48.2 | 33.7 | 61.4 | .462 | 1.20 |
| 633 | 3125 | 39.2 | 37.7 | 44.8 | 32.9 | .586 | 0.96 |
| 901 | 783 | 82.5 | 62.5 | 30.4 | 37.8 | .605 | 0.76 |
| 902 | 1572 | 47.1 | 48.0 | 30.0 | 23.9 | .735 | 1.02 |
| 832 | 2910 | 86.0 | 104.7 | 60.4 | 81.1 | .744 | 1.22 |
| 832D | 1589 | 104.3 | 95.3 | 81.7 | 71.9 | .946 | 0.91 |
| 841 | 2181 | 95.7 | 101.2 | 56.7 | 87.0 | .551 | 1.06 |
| Total* | 13415 | 62.2 | 67.4 | 52.4 | 68.3 | .666 | 1.08 |

* Excludes 832D.

| SITE | No. Obs. | Means |  | Std. Deviations |  | Corr. | Ratio of Means |
|---|---|---|---|---|---|---|---|
|  |  | CHEM | TECH | CHEM | TECH |  |  |
| 632 | 2012 | 44.0 | 50.5 | 34.6 | 41.6 | .588 | 1.15 |
| 633 | 2242 | 45.7 | 65.6 | 52.9 | 69.3 | .835 | 1.43 |
| Total | 4254 | 44.9 | 58.4 | 45.1 | 58.4 | .765 | 1.30 |

| SITE | No. Obs. | Means |  | Std. Deviations |  | Corr. | Ratio of Means |
|---|---|---|---|---|---|---|---|
|  |  | TEC4 | TECH | TEC4 | TECH |  |  |
| 632 | 2705 | 49.1 | 55.1 | 43.0 | 46.3 | .698 | 1.12 |
| 633 | 2700 | 41.6 | 64.9 | 38.4 | 67.8 | .687 | 1.56 |
| Total | 5405 | 45.4 | 60.0 | 40.9 | 58.2 | .658 | 1.32 |

[1/] The statistics in this table are shown for descriptive purposes only. Their general use is not recommended (see Section 5.4).

1) considerable variation in the actual degree of $NO_2$ fluctuations for the various sites, and
2) the presence of outliers.

Low correlations between methods are to be expected if the true $NO_2$ remains stable within a day and from day-to-day. Higher correlations would tend to result for those sites where large $NO_2$ fluctuations are experienced. Previous results for the daily data indicate that larger $NO_2$ daily fluctuations occur in the California sites. Hence, it is reasonable that the highest correlations occur for these sites. The second analysis indicates that larger within-day fluctuations also occur for these sites; it also indicates the presence of outliers.

This second analysis is summarized in detail in Appendix Table F-1. Outliers are indicated for those hours which exhibit correlations which are small, and standard deviations which are large, relative to the other hours. For example, in site 901, hours 6 and 16 show correlations of .216 and -.006, respectively, between the TEC4 and CHEM, whereas for the other hours, the correlations are about 0.7 or 0.8. The TEC4 standard deviations for these two hours are more than two times larger than those for the other hours.

The information shown in Table 4.18, which was extracted from Table F-1, demonstrates clearly the inconsistencies that occur for the various sites - with respect to both correlations and magnitudes of the paired (TEC4 and CHEM) means. As shown in Table F-1, twenty-four means, correlations, etc. were computed for each site. The largest and smallest sample sizes,

### Table 4.18

### Summary of Hourly Results

### For the TEC4 and CHEM[1]

| | Sample Size | | Correlations | | | Ratios of TEC4[3] MEAN to CHEM MEAN | | |
|---|---|---|---|---|---|---|---|---|
| Site | Low[2] | High | Low | Median | High | Low | Median | High |
| 632 | 127 | 141 | .184 | .481 | .941 | 0.879 | 1.235 | 1.373 |
| 633 | 131 | 144 | .159 | .531 | .855 | 0.843 | .978 | 1.093 |
| 901 | 10 | 48 | -.006 | .761 | .878 | 0.622 | .780 | 0.937 |
| 902 | 31 | 76 | .466 | .709 | .912 | 0.918 | 1.026 | 1.110 |
| 832 | 75 | 133 | .391 | .768 | .902 | 1.022 | 1.219 | 1.375 |
| 841 | 66 | 105 | .341 | .563 | .880 | 0.733 | 1.114 | 1.208 |
| 832D | 40 | 77 | .833 | .939 | .986 | 0.834 | .923 | 0.966 |

[1] See Appendix F for more detailed information on these two methods as well as on the TECH method.

[2] This value is the number of observations for that hour of the day which had the fewest paired CHEM and TEC4 readings.

[3] The statistics in this table are shown for descriptive purposes only. Their general use is not recommended (see Section 5.4).

correlations, and ratios of means (out of the twenty-four) are shown in Table 4.18. Also given are the median correlations and the median of the mean ratios. For example, in site 632, the sample sizes ranged from 127 to 141, the correlations, from .184 to .941, and the ratios of means, from 0.879 to 1.373; one-half (i.e., 12) of the correlations were less than 0.481 and one-half of the ratios exceeded 1.235. Table 4.18 shows that the TEC4-CHEM correlations vary considerably from site-to-site and, except for site 832D, within sites. The median ratios indicate that the CHEM and TEC4 compare favorably (i.e., are of same magnitude) only in sites 633 and 902. It is interesting to note that in site 832 the TEC4 means are larger than the CHEM means for all twenty-four hours whereas for the duplicate measurements, site 832D, the reverse is true.

Appendix F contains plots of the paired means for the TECH, TEC4, and CHEM over hours of the day (diurnal averages).

# 5. SUMMARY

## 5.1 Introduction

The purpose of this report was, on the basis of ambient air sampling data from seven stations (sites), to compare nine different methods for monitoring nitrogen dioxide. The locations of the seven stations are given in Table 4.1. Two stations in Chattanooga (Sites 632 and 633) contained all nine $NO_2$ monitoring methods; the other five stations (Sites 901 and 902 in St. Louis, and Sites 831, 832, and 841 in the Los Angeles vicinity) contained eight methods. The methods are described in Section 3, and the notation used for them is given in Table 5.1.

Sampling data during the period July, 1972 through April, 1973 were gathered, processed and validated by EPA. After making the necessary calibration and collection efficiency corrections, EPA sent two data sets to RTI: one containing data on an hourly basis (for the continuous monitors), and one based on (approximately) 24-hour sampling periods[1/]. As described in Section 4.3, [illegible] screened the daily data for outlying observations. This resulted in the removal of 60 (out of about 10,000) of the daily readings. All daily results shown in this section are based on these screened data and the assumption that the collection efficiencies given in Table 5.1 are

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[1/] Daily averages for the continuously-monitoring methods required that 75% of the hourly data be available. The averages were taken over the time period during which the bubblers were operating.

Table 5.1

$NO_2$ Monitoring Methods

| | Method Name | Notation | Assumed Collection Efficiency | Comments |
|---|---|---|---|---|
| 1. | Federal Reference Method | FRMF | 35% | Bubbler, daily readings |
| 2. | Triethanolamine Method (Fritted Bubbler) | TEAF | 100% | Bubbler, daily readings |
| 3. | Arsenite Method (Fritted Bubbler) | CHRF | 85% | Bubbler, daily readings |
| 4. | Arsenite Method (Straight Tube Impinger) | CHRO | 85% | Bubbler, daily readings |
| 5. | Chattanooga Health Effects Study Method | CHESSO | 35% | Bubbler, daily readings |
| 6. | Triethanolamine-Guaiacol-Sulfite Method (Straight Tube Impinger) | TGSO | 100% | Bubbler, daily readings, sampling began in September, 1972 |
| 7. | Continuous Saltzman (II) (Chattanooga) | TECH | | Used in Chattanooga only; hourly strip chart readings are averaged over time period corresponding to bubbler operation to obtain "daily" values |
| 8. | Continuous Saltzman (Technicon Mark IV) | TEC4 | | 5-minute readouts or hourly strip charts are averaged over time period corresponding to bubbler operation to obtain "daily" values |
| 9. | Chemiluminescent | CHEM | | Same as TEC4 comment |

appropriate.

The following subsection provides a brief discussion of the procedures and results of the daily data analysis. Section 5.3 summarizes the hourly data analysis. Section 5.4 suggests some areas of future research regarding the comparison of $NO_2$ monitoring methods that should be explored.

## 5.2 Daily Data Analysis

The objectives of this analysis were

a) to determine the relative operating performance of the various methods (e.g., by comparing precision of methods),

and

b) to determine the comparability of (daily) $NO_2$ readings as given by the various methods (e.g., by comparing magnitudes of means, and correlations and regression relationships between the methods).

Duplicate data were available in Site 832. These data were primarily obtained in order to estimate method precision. The results, which are applicable only for this site, are given in Section 4.4.e. The TEC4 appeared to have the best precision and the CHESSO, the worst. The duplicate data also served to point out that method bias may be a serious problem (see Section 4.4.e). For example, based on 50 days of data, two CHEM instruments at this site had means of 85.1 and 107.5 $\mu g/m^3$. One of these instruments gave readings higher than the other on 44 of the 50 days.

To satisfy objective (b), three basic questions had to be considered in the analysis of the daily data:

i) What form of relationship will provide adequate fits to the data?

ii) Are separate analyses required for each site or for different ranges of $NO_2$ concentrations?

iii) How should the relationships be estimated?

The correlations between most of the methods were above 0.7; these correlations, in conjunction with scatter plots of the data, indicated that linear relationships over the entire ranges of the data would probably characterize pairs of methods satisfactorily.[1/] Large variation rather than lack of linearity appeared to be responsible for those correlations which were low. Hence, the form of the estimated relationship between a pair of methods (method X and method Y) was taken to be

$$Y = A + BX.$$

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[1/] Data were not made available to RTI on (possible) interferences; hence the relationships given in this report could not include such effects.

Since both variables X and Y are subject to measurement errors, and since it was desirable to have a single, consistent relationship between pairs of methods, the estimates A and B were obtained using orthogonal regression rather than ordinary regression. Initially, separate relationships (between a given pair of methods) were estimated for each site. Based solely on statistical criteria, different relationships quite frequently would be indicated for the seven different sites. However, from a practical point of view, estimated relationships between the methods should be based on the combined data, since the seven sites are hopefully representative of a larger population of sites. Hence, it is appropriate that site variability be included as a component of error variation, i.e., separate relationships should be avoided, if possible, except as they may be used to provide checks on how these particular seven sites compare.

Table 5.2 shows the overall (i.e., data from seven sites is pooled) paired summary statistics for the 28 method pairs. (The TECH is excluded since it was present in only two stations.) The pairs are ordered according to their correlations--from those pairs having the highest correlations to those with the lowest. From this ordering, it is clear that the best correlations occur between five of the six bubblers (excluding the CHESSO)[1/];

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[1/] Of these five bubblers, the TGSO generally has the poorest correlations. This appears to be the result of problems encountered during the early phases of data collection activity (see Section 4.4.b). In addition, it is important to note that the TGSO method used in the present study has been subsequently modified.

TABLE 5.2. SUMMARY STATISTICS4/:DAILY DATA COMBINED OVER SITES1/

| METHOD_1 | METHOD_2 | N | MEAN_1 | MEAN_2 | STD_1 | STD_2 | CORR | RATIO2/ | CV_13/ | CV_2 |
|---|---|---|---|---|---|---|---|---|---|---|
| CHRF | CHRO | 1326 | 49.0 | 47.0 | 25.6 | 24.0 | .927 | 0.958 | 52.2 | 51. |
| TEAF | CHRO | 1285 | 37.9 | 46.4 | 20.5 | 23.2 | .858 | 1.223 | 54.0 | 50.1 |
| TEAF | CHRF | 1310 | 38.1 | 48.5 | 20.6 | 25.0 | .846 | 1.271 | 54.0 | 51.5 |
| TEC4 | CHEM | 545 | 63.5 | 59.9 | 39.3 | 36.7 | .827 | 0.943 | 61.8 | 61.2 |
| FRMF | TEAF | 1290 | 75.3 | 38.1 | 38.2 | 20.7 | .809 | 0.505 | 50.8 | 54.5 |
| CHRF | TGSO | 650 | 47.4 | 38.9 | 25.0 | 24.7 | .805 | 0.820 | 52.8 | 63.4 |
| CHRC | TGSO | 633 | 46.6 | 38.7 | 24.0 | 24.7 | .790 | 0.831 | 51.4 | 63.9 |
| FRMF | CHRO | 1313 | 76.0 | 46.9 | 38.6 | 24.0 | .787 | 0.617 | 50.8 | 51.2 |
| FRMF | CHRF | 1337 | 76.6 | 49.0 | 39.3 | 25.6 | .773 | 0.640 | 51.2 | 52.2 |
| TEAF | TGSO | 625 | 38.4 | 37.8 | 21.5 | 23.6 | .762 | 0.987 | 56.1 | 62.5 |
| TEAF | TEC4 | 619 | 35.6 | 58.8 | 19.2 | 35.6 | .757 | 1.652 | 53.9 | 60.5 |
| TEAF | CHEM | 635 | 35.9 | 55.0 | 19.2 | 33.5 | .757 | 1.534 | 53.5 | 60.9 |
| CHRC | TEC4 | 643 | 43.9 | 61.7 | 22.8 | 39.3 | .752 | 1.405 | 52.0 | 63.7 |
| CHRC | CHEM | 650 | 44.5 | 56.4 | 22.8 | 34.5 | .737 | 1.266 | 51.1 | 61.2 |
| TGSC | CHEM | 351 | 35.7 | 56.8 | 22.5 | 35.0 | .730 | 1.590 | 63.1 | 61.6 |
| CHRF | CHEM | 663 | 47.2 | 56.9 | 24.7 | 35.2 | .729 | 1.206 | 52.4 | 61.8 |
| TGSC | TEC4 | 302 | 39.5 | 65.9 | 25.2 | 46.1 | .723 | 1.668 | 63.9 | 70.0 |
| CHRF | TEC4 | 655 | 46.4 | 62.2 | 24.9 | 39.6 | .715 | 1.341 | 53.7 | 63.6 |
| FRMF | TEC4 | 637 | 72.6 | 61.9 | 38.7 | 40.0 | .713 | 0.853 | 53.3 | 64.7 |
| FRMF | TGSO | 648 | 80.7 | 39.0 | 41.2 | 25.0 | .689 | 0.484 | 51.1 | 64.1 |
| FRMF | CHEM | 648 | 72.1 | 56.6 | 36.8 | 35.0 | .687 | 0.786 | 51.0 | 61.7 |
| CHESSC | TEC4 | 635 | 51.1 | 62.3 | 34.7 | 39.7 | .646 | 1.219 | 67.9 | 63.8 |
| CHRF | CHESSO | 1184 | 48.4 | 55.1 | 25.1 | 33.3 | .620 | 1.140 | 52.0 | 60.4 |
| TEAF | CHESSO | 1141 | 37.4 | 53.8 | 20.4 | 32.4 | .613 | 1.439 | 54.7 | 60.1 |
| CHESSC | CHEM | 645 | 52.3 | 57.7 | 33.5 | 37.3 | .596 | 1.105 | 64.1 | 64.6 |
| FRMF | CHESSO | 1166 | 75.6 | 54.9 | 39.5 | 33.5 | .594 | 0.726 | 52.3 | 61.0 |
| CHRC | CHESSO | 1169 | 46.3 | 54.6 | 23.6 | 32.5 | .590 | 1.179 | 51.1 | 59.6 |
| CHESSC | TGSO | 556 | 60.1 | 38.6 | 36.4 | 24.2 | .496 | 0.642 | 60.6 | 62.8 |

1/ Over Sites--632, 633, 901, 902, 831, 832 and 841.

2/ Ratio = Mean 2/Mean 1.

3/ CV-1 = STD 1/Mean 1 x 100%; similarly for CV-2.

4/ The statistics in this table are shown for descriptive purposes only. Their general use is not recommended (see Section 5.4).

the two continuous methods (TEC4, CHEM) also correlate well. Somewhat lower correlations occur between the five bubblers (excluding the CHESSO) and the continuous methods. The CHESSO correlated poorly with all other methods.

Table 5.2 also presents the means, standard deviations, ratios of means, and coefficients of variation for the twenty-eight pairs of methods. Higher coefficients of variation are indicated for the CHEM, TEC4, CHESSO, and TGSO than for the other methods. The ratios of means may indicate that the assumed collection efficiencies for the bubbler methods are inappropriate since the rank order of method means is inversely related to these assumed efficiencies. This ordering is illustrated below (the ratios are extracted from Table 5.2):

| Method | Ratio of Mean to FRMF Mean | Assumed Collection Efficiency | Type of Method |
|---|---|---|---|
| FRMF | 1.000 | 35% | Bubbler |
| TEC4 | .853 | | Continuous Monitor |
| CHEM | .786 | | Continuous Monitor |
| CHESSO | .726 | 35% | Bubbler |
| CHRF | .640 | 85% | Bubbler |
| CHRO | .617 | 85% | Bubbler |
| TEAF | .505 | 100% | Bubbler |
| TGSO | .484 | 100% | Bubbler |

The orthogonal regression results are summarized in Table 5.3; in

Table 5.3 Estimated Relationships Between Methods[1]

Based on the Combined Data Over Sites[2]

| METH1 | METH2 | N | CCR | A | B | PCV1 | M1LOW[3] | M1HIGH | M2LOW | M2 |
|---|---|---|---|---|---|---|---|---|---|---|
| FRMF | TEAF | 1290 | .809 | 2.0033 | 0.47865 | 93.5 | 0.0 | 151.2 | 1.7 | 74.4 |
| FRMF | CHRF | 1337 | .773 | 4.5189 | 0.58082 | 90.7 | 0.0 | 153.8 | 4.2 | 93.9 |
| FRMF | CHRO | 1313 | .787 | 4.7961 | 0.55405 | 91.7 | 0.0 | 152.1 | 4.7 | 8[illegible].1 |
| FRMF | CHESSO | 1166 | .594 | -2.4402 | 0.75857 | 80.4 | 1.6 | 149.6 | 0.0 | 1.0 |
| FRMF | TGSO | 648 | .689 | -1.1686 | 0.49813 | 88.3 | 0.0 | 161.8 | 0.0 | 79.4 |
| FRMF | TECH | 265 | .549 | -9.9188 | 1.18309 | 77.7 | 12.0 | 100.0 | 4.2 | 108.4 |
| FRMF | TEC4 | 637 | .713 | -14.1319 | 1.04755 | 85.7 | 1.4 | 143.7 | 0.0 | 136.4 |
| FRMF | CHEM | 648 | .687 | -10.4000 | 0.93014 | 84.4 | 3.8 | 140.3 | 0.0 | 120.1 |
| TEAF | CHRF | 1310 | .846 | 0.5442 | 1.25673 | 92.6 | 0.0 | 76.9 | 0.0 | 97.2 |
| TEAF | CHRO | 1285 | .858 | 2.4597 | 1.15771 | 93.0 | 0.0 | 77.0 | 1.2 | 91.6 |
| TEAF | CHESSO | 1141 | .613 | -22.4750 | 2.04057 | 85.0 | 6.3 | 68.4 | 0.0 | 117.2 |
| TEAF | TGSO | 625 | .762 | -5.5566 | 1.13143 | 88.2 | 0.0 | 78.1 | 0.0 | 82.8 |
| TEAF | TECH | 266 | .729 | -17.2975 | 2.63888 | 92.4 | 6.4 | 49.8 | 0.0 | 114.0 |
| TEAF | TEC4 | 619 | .757 | -19.2612 | 2.19319 | 91.9 | 3.4 | 67.8 | 0.0 | 129.4 |
| TEAF | CHEM | 635 | .757 | -18.1422 | 2.03941 | 91.3 | 3.4 | 68.4 | 0.0 | 121.3 |

Table 5.3 (Continued)

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CHRF | CHRO | 1326 | .927 | 1.2385 | 0.93297 | 96.4 | 0.0 | 99.4 | 0.0 | 94.0 |
| CHRF | CHESSO | 1184 | .620 | -20.3683 | 1.56150 | 82.8 | 7.4 | 89.3 | 0.0 | 119.1 |
| CHRF | TGSO | 650 | .805 | -7.651[illegible] | 0.98116 | 90.2 | 0.0 | 95.1 | 0.0 | 85.7 |
| CHRF | TECH | 268 | .709 | -25.8400 | 2.58627 | 91.6 | 9.9 | 54.1 | 0.0 | [illegible] |
| CHRF | TEC4 | 655 | .715 | -24.7639 | 1.87449 | 88.8 | 4.9 | 87.9 | 0.0 | 140.0 |
| CHRF | CHEM | 663 | .729 | -19.0056 | 1.60937 | 88.2 | 4.6 | 89.8 | 0.0 | 125.5 |
| CHRO | CHESSO | 1169 | .590 | -23.7845 | 1.69291 | 82.0 | 9.2 | 83.3 | 0.0 | 117.3 |
| CHRO | TGSO | 633 | .790 | -9.7597 | 1.04031 | 89.5 | 1.4 | 91.7 | 0.0 | 85.6 |
| CHRO | TECH | 270 | .678 | -29.7785 | 2.66998 | 90.7 | 11.0 | 53.7 | 0.0 | 113.7 |
| CHRO | TEC4 | 643 | .752 | -26.6239 | 2.01044 | 91.0 | 5.3 | 82.6 | 0.0 | 139.4 |
| CHRO | CHEM | 650 | .737 | -21.0308 | 1.73832 | 89.2 | 5.6 | 83.5 | 0.0 | 124.1 |
| CHESSO | TGSO | 556 | .496 | 10.6553 | 0.46470 | 79.9 | 0.0 | 131.1 | 5.6 | 71.6 |
| CHESSO | TECH | 261 | .292 | -53.7663 | 3.10822 | 73.2 | 16.6 | 53.4 | 0.0 | 112.2 |
| CHESSO | TEC4 | 635 | .646 | -0.7229 | 1.23363 | 82.7 | 0.0 | 111.5 | 0.0 | 136.8 |
| CHESSO | CHEM | 645 | .596 | -4.7070 | 1.19481 | 80.1 | 0.0 | 109.8 | 0.0 | 126.5 |

Table 5.3 (Continued)

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TGSC | TECH | 191 | .538 | -22.6463 | 2.73142 | 85.1 | 7.3 | 50.4 | 0.0 | 114.9 |
| TGSO | TEC4 | 302 | .723 | -21.8427 | 2.22101 | 90.7 | 0.0 | 80.6 | 0.0 | 157.2 |
| TGSC | CHEM | 351 | .730 | 7.5240 | 1.80081 | 89.1 | 0.0 | 73.8 | 0.0 | 12 |
| TECH | TEC4 | 227 | .560 | 12.73 | 0.53795 | 81.5 | 0.0 | 118.4 | 12.7 | 76.5 |
| TECH | CHEM | 222 | .643 | 9.5804 | 0.61950 | 84.2 | 0.0 | 114.7 | 8.0 | 80.6 |
| TEC4 | CHEM | 545 | .827 | 1.4387 | 0.92066 | 91.4 | 0.0 | 139.1 | 0.0 | 129. |

1/ The estimated relationship is of the form Meth 2 = A + B (Meth 1). The statistics in this table are shown for descriptive purposes only. Their general use is not recommended (see Section 5.4).

2/ Over sites 632, 633, 901, 902, 831, 832 and 841.

3/ M1LOW, M1HIGH = recommended range for method 1 over which the estimated relationship is applicable; M2LOW, M2HIGH = same for method 2.

NOTE: If M1LOW or M2LOW was negative it was set at 0 $\mu g/m^3$.

this table, X corresponds to method #1 and Y to method #2 and the form of the estimated relationship is Y = A + BX. The remaining notation used in this table is defined below:

N = number of (paired) observations

COR = correlation between X and Y

PCV1 = the percentage of variability accounted for by the first principal component (see equation 4.7)

(M1LOW, M1HIGH) = recommended range for method 1 over which the estimated relationship is applicable

(M2LOW, M2HIGH) = same for method 2

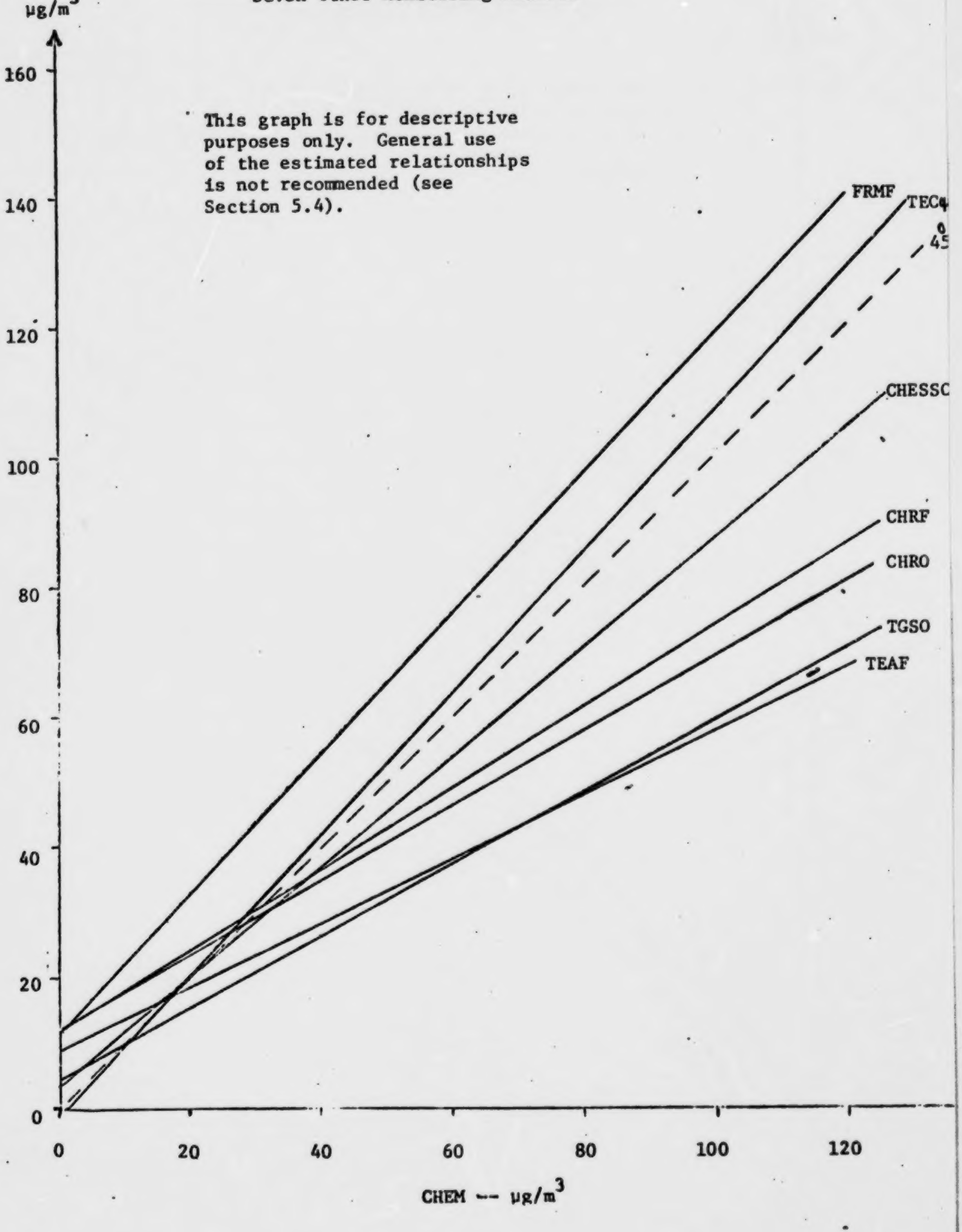
The correlation and the variable PCV1 provide an indication of the precision of the estimated relationships between the pairs of methods. Some of the estimated relationships indicated by Table 5.3 are portrayed graphically in Figures 5.1 and 5.2. Figure 5.1 provides plots of the estimated relationships between the CHEM and the other seven methods. Figure 5.2 gives analogous plots for the CHRO.

Because one does not know the true concentration of $NO_2$ in ambient air, it is impossible to say which method gives the most accurate daily readings. Problems in calibration and/or inaccuracy of collection efficiency determinations (for use in field applications) are evident because of the failure of the various methods to give consistent readings. In particular, the daily data analysis demonstrated these problems in several ways:

a) systematic variation for the duplicate readings at Site 832

Figure 5.1

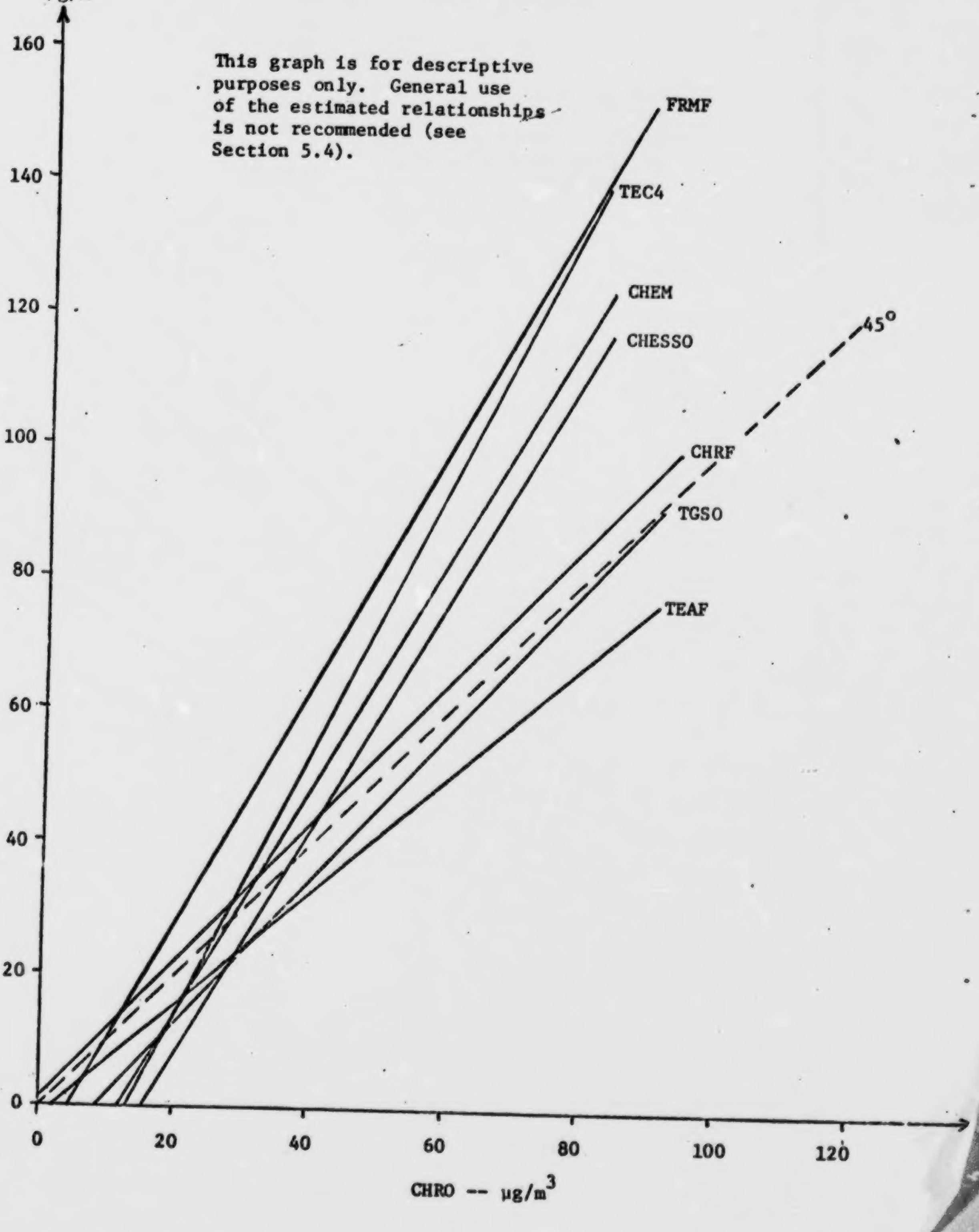
Estimated Relationships Between the CHEM and Seven Other Monitoring Methods



This graph is for descriptive purposes only. General use of the estimated relationships is not recommended (see Section 5.4).

Figure 5.2

Estimated Relationships Between the CHRO and Seven Other Monitoring Methods



This graph is for descriptive purposes only. General use of the estimated relationships is not recommended (see Section 5.4).

(indicating biases in one or both sets of readings),

b) the ordering of method readings (or means)--an order which was, in general, inversely related to the assumed collection efficiencies,

c) the variation in method relationships from site-to-site, and

d) the failure of the estimated relationships (of the form Y = A + BX) to reduce, approximately, to the form Y = X (i.e., A = 0, B = 1) in the majority of cases.

## 5.3 Hourly Data Analysis

The emphasis of this report was placed on daily, rather than hourly, analyses, since most of the methods provide only the 24-hour integrated samples. Table 5.4 below provides a brief summary of the (paired) hourly data for the TEC4 and CHEM methods. In this table, Site 832D refers to the measurements made by the duplicate instruments in Site 832.

Table 5.4

Summary Statistics Based on
Paired Hourly Averages-by Site[1]

| SITE | No. OBS. | Means | | Std. Deviations | | Corr. | Ratio of Means |
|---|---|---|---|---|---|---|---|
| | | CHEM | TEC4 | CHEM | TEC4 | | |
| 632 | 2844 | 40.1 | 48.2 | 33.7 | 61.4 | .462 | 1.20 |
| 633 | 3125 | 39.2 | 37.7 | 44.8 | 32.9 | .586 | 0.96 |
| 901 | 783 | 82.5 | 62.5 | 30.4 | 37.8 | .605 | 0.76 |
| 902 | 1572 | 47.1 | 48.0 | 30.0 | 23.9 | .735 | 1.02 |
| 832 | 2910 | 86.0 | 104.7 | 60.4 | 81.1 | .744 | 1.22 |
| 832D | 1589 | 104.3 | 95.3 | 81.7 | 71.9 | .946 | 0.91 |
| 841 | 2181 | 95.7 | 101.2 | 56.7 | 87.0 | .551 | 1.06 |
| Total* | 13415 | 62.2 | 67.4 | 52.4 | 68.3 | .666 | 1.08 |

* Excludes 832D.

[1] The statistics in this table are shown for descriptive purposes only. Their general use is not recommended (see Section 5.4).

This table indicates

a) extensive variation in the correlations from site-to-site,

b) the problem of instrument bias (Site 832 versus Site 832D),

c) ratios of means which are comparable to the ratios based on the daily data, and

d) an over-site hourly correlation (.66) which is noticeably lower than the corresponding daily correlation (.83).

The variation in the correlations appears to be brought about by

1) considerable variation in the actual $NO_2$ fluctuations for the various sites, and

2) the presence of outliers in the hourly data.[1/]

The TEC4 and CHEM means compare most favorably in Sites 632 and 902 (ratios equal .96 and 1.02, respectively). More detailed results and discussion are given in Section 4.5 and Appendix F.

## 5.4 Recommendations

The results presented in this report do not indicate that a particular one of the nine monitoring methods studied is the "best" method for monitoring $NO_2$. Additional sampling in both the laboratory and field will be required before such a recommendation can be made. The main problem encountered with field data, such as that analyzed in this report, is that

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[1/] The hourly data were validated by EPA. However, RTI did not extensively screen these hourly data for outliers (see Section 4.5).

the true amount of $NO_2$ in the air is not known. Hence, it is impossible to say which method is closest to the true value, i.e., the bias of each method cannot be determined. Only in the laboratory where the level of $NO_2$ can be controlled can this question of bias be answered. Thus, the present study was mainly limited to studying the relationships between the nine monitoring methods (e.g., ratios of means, correlations, and regression relationships between methods) over varying conditions such as location (i.e., sites). These relationships indicate the interrelatability of the methods but do not estimate the bias of each method. In addition to the problem of estimation of bias, other problems with the current data that make additional sampling necessary are: lack of data on interferences, variation in sample statistics from site to site (e.g., the correlation coefficients between some methods vary a great deal over sites), calibration problems with the continuous monitors and lack of data on method precision. In fact, because of the many limitations of the field data analyzed in this report, RTI does not recommend that the functional relationships between monitoring methods given here (e.g., Table 5.3) be used in general for describing the relationship between the pairs of methods. Instead, additional field testing at other sites (e.g., where the ranges of $NO_2$ and the interferences in the air are different than the sites studied in this report) and laboratory testing should be carried out to further investigate these functional relationships. Of course, the relationships given here do give an indication of how the various methods relate to one another; but indiscriminate use of these relationships (e.g., converting $NO_2$ measurements from one method to another at any site in the United States) is not recommended.

Based on the results given in this report RTI would recommend that additional work on determining an $NO_2$ monitoring method be limited to a subset of the nine methods studied here. In particular, RTI would suggest the following strategy:

A. The CHESSO and FRMF methods should be dropped from consideration because of their variable collection efficiency and relatively low precision.

B. Since the other four bubblers (CHRO, CHRF, TEAF and TGSO) appear to be fairly closely related, only one or two of them need be considered in future work. One possibility would be one arsenite and one triethanolamine method; for example, the CHRO and TEAF. Additional work on the effect of interferences[1] may suggest which of these four bubblers should be considered in future work.

C. Both the TEC4 and CHEM methods should be studied further.

Using this subset of four of the original nine methods, RTI would suggest that the following laboratory and field work be carried out:

(1) An extensive laboratory analysis of the various $NO_2$ monitor-

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[1] As mentioned previously the effects of interferences (e.g., ozone and NO) were not studied in this report. However, data on NO and ozone is now available for the July 1, 1972 through April 30, 1973 time period which can be used along with the $NO_2$ data examined in this report to determine interference effects on the various $NO_2$ monitoring methods.

ing methods should be undertaken. This study could investigate the bias of each method over a wide range of known $NO_2$ levels. This type of study would hopefully answer the collection efficiency question that affects all of the bubbler methods. In addition, if it is feasible to control not only $NO_2$ levels but also interference levels (e.g., of NO and ozone) in the laboratory, then at least a preliminary evaluation of the effect of interferences could be made. Of course, in any laboratory analysis of this kind it would be essential that an experimental design be developed before sampling begins to ensure that all of the information required could be obtained in the most efficient manner.

(2) Sampling in the field with the continuous monitors should be continued. As described in the present report, EPA had a great many problems in obtaining valid data from the TEC4 and CHEM instruments (e.g., calibration problems). Thus, it would seem appropriate to obtain more experience in the field with these methods.

(3) In the current study only one site (832) had more than one method of the same type (e.g., two CHEM instruments). Accordingly, RTI could only estimate the precision of each of the monitoring methods at this site. Thus, in the future additional sampling should be carried out at other sites with duplicate methods. This would allow factors such as $NO_2$ levels, operator effects,

etc. to be considered in determining method precision. As mentioned previously one of the CHEM instruments in site 832 in the present study had readings which were consistently lower than the other CHEM instrument. This could indicate a large bias in one or both of these instruments. Thus, additional duplicate sampling is required for the CHEM instruments since a monitoring method is not of much value if, in the same site, two instruments of the same kind do not give consistent results. The laboratory analysis mentioned in (1) above could also be used to estimate method precision.

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# APPENDIX A. SUMMARY STATISTICS BY SITE

On the following pages is a listing of summary statistics (in $\mu g/m^3$) for the daily data. The listing is by method and site. The site codes have been given in Section 4.2. All statistics are based on unpaired data after removing outliers. Two tables are given for each site. The first gives the percentage (frequency) distribution and the corresponding cumulative distribution. The second table gives, for each method

1) NO. OBS. = number of daily readings
2) MIN. VALUE
3) MEDIAN VALUE = sample median
4) MAX. VALUE
5) ARITH. MEAN = arithmetic mean of the readings
6) GEØM. MEAN = geometric mean of the readings
7) STD. DEV. = standard deviation of the readings
8) STD.D OF LNS = standard deviation of the natural logarithm of the readings.

SUMMARY STATISTICS CHATTANOOGA-SITE 632 SCREENED NO2 DATA

| VARIABLE | NO. OBS. | <= 15. | 15.- 30. | 30.- 45. | 45.- 60. | 60.- 75. | 75.- 90. | 90.-105. | 105.-120. | 120.-135. | 135.-150. | >150 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FREQUENCY DISTRIBUTION | | | | | | | | | | |
| FRMF | 221 | 0.90<br>0.90 | 12.22<br>13.12 | 26.24<br>39.37 | 20.81<br>60.18 | 21.27<br>81.45 | 11.31<br>92.76 | 2.71<br>95.48 | 1.81<br>97.29 | 0.45<br>97.74 | 1.81<br>99.55 | 0.45<br>100.00 |
| TEAF | 226 | 15.93<br>15.93 | 49.12<br>65.04 | 26.11<br>91.15 | 5.75<br>96.90 | 1.33<br>98.23 | 1.33<br>99.56 | 0.44<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |
| CHRF | 224 | 5.80<br>5.80 | 40.63<br>46.43 | 32.59<br>79.02 | 14.29<br>93.30 | 3.57<br>96.87 | 2.23<br>99.11 | 0.45<br>99.55 | 0.45<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |
| CHRC | 230 | 6.96<br>6.96 | 40.00<br>46.96 | 33.91<br>80.87 | 12.61<br>93.48 | 3.91<br>97.39 | 2.17<br>99.57 | 0.43<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |
| CHEBSC | 250 | 11.20<br>11.20 | 40.80<br>52.00 | 28.40<br>80.40 | 12.00<br>92.40 | 3.60<br>96.00 | 2.80<br>98.80 | 0.40<br>99.20 | 0.0<br>99.20 | 0.40<br>99.60 | 0.40<br>100.00 | 0.0<br>100.00 |
| TGBD | 114 | 16.67<br>16.67 | 55.26<br>71.93 | 17.54<br>89.47 | 7.02<br>96.49 | 1.75<br>98.25 | 0.88<br>99.12 | 0.88<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |
| TECH | 164 | 2.44<br>2.44 | 14.02<br>16.46 | 25.61<br>42.07 | 28.05<br>70.12 | 15.24<br>85.37 | 7.32<br>92.68 | 3.66<br>96.34 | 0.0<br>96.34 | 1.22<br>97.56 | 1.83<br>99.39 | 0.61<br>100.00 |
| TEC4 | 182 | 3.85<br>3.85 | 18.68<br>22.53 | 35.16<br>57.69 | 19.23<br>76.92 | 14.29<br>91.21 | 4.40<br>95.60 | 3.30<br>98.90 | 0.0<br>98.90 | 1.10<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |
| CHEM | 190 | 6.32<br>6.32 | 23.16<br>29.47 | 33.68<br>63.16 | 23.16<br>86.32 | 8.95<br>95.26 | 2.63<br>97.89 | 1.05<br>98.95 | 0.0<br>98.95 | 0.53<br>99.47 | 0.53<br>100.00 | 0.0<br>100.00 |

| VARIABLE | NO. OBS. | MIN. VALUE | MEDIAN VALUE | MAX. VALUE | ARITH. MEAN | GEOM. MEAN | STD. DEV. | STD.D. OF LNS |
|---|---|---|---|---|---|---|---|---|
| FRMF | 221 | 13.1000 | 53.6000 | 153.1000 | 55.8953 | 50.4715 | 25.5033 | 0.4639 |
| TEAF | 226 | 7.8000 | 25.6500 | 95.6000 | 28.1646 | 25.3161 | 13.6345 | 0.4643 |
| CHRF | 224 | 4.0000 | 30.7059 | 107.2941 | 34.4618 | 31.1601 | 15.9006 | 0.4647 |
| CHRC | 230 | 7.0471 | 31.7059 | 92.8235 | 34.3509 | 31.0839 | 15.4723 | 0.4585 |
| CHEBSC | 250 | 4.7000 | 28.9500 | 143.4000 | 33.2707 | 28.8226 | 19.1854 | 0.5422 |
| TGBC | 114 | 4.4000 | 24.4500 | 93.5000 | 27.1771 | 23.9181 | 14.7066 | 0.5143 |
| TECH | 164 | 9.4000 | 48.5000 | 177.3000 | 52.4782 | 46.2562 | 27.0047 | 0.5192 |
| TEC4 | 182 | 8.1000 | 41.5500 | 132.0000 | 45.6841 | 40.4497 | 22.2639 | 0.5148 |
| CHEM | 190 | 3.9000 | 38.8000 | 149.3000 | 41.7786 | 37.0648 | 20.2596 | 0.5195 |

SUMMARY STATISTICS CHATTANOOGA-SITE 633 SCREENED NO2 DATA

| VARIABLE | NO. OBS. | <= 15. | 15.- 30. | 30.- 45. | 45.- 60. | 60.- 75. | 75.- 90. | 90.-105. | 105.-120. | 120.-135. | 135.-150. | >150 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FREQUENCY DISTRIBUTION | | | | | | | | | | |
| FRMP | 234 | 1.28<br>1.28 | 16.24<br>17.52 | 23.93<br>41.45 | 26.92<br>68.38 | 15.81<br>84.19 | 5.98<br>90.17 | 2.99<br>93.16 | 4.70<br>97.86 | 0.85<br>98.72 | 0.85<br>99.57 | 0.43<br>100.00 |
| TEAF | 230 | 21.30<br>21.30 | 52.17<br>73.48 | 17.39<br>90.87 | 6.96<br>97.83 | 2.17<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |
| CHRF | 230 | 8.70<br>8.70 | 40.87<br>49.57 | 28.26<br>77.83 | 16.52<br>94.35 | 4.35<br>98.70 | 0.87<br>99.57 | 0.43<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |
| CHMC | 232 | 9.05<br>9.05 | 42.24<br>51.29 | 29.74<br>81.03 | 15.95<br>96.98 | 1.72<br>98.71 | 1.29<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |
| CHESSC | 244 | 9.02<br>9.02 | 40.16<br>49.18 | 30.74<br>79.92 | 13.11<br>93.03 | 4.92<br>97.95 | 1.64<br>99.59 | 0.0<br>99.59 | 0.0<br>99.59 | 0.0<br>99.59 | 0.0<br>99.59 | 0.41<br>100.00 |
| TGSC | 112 | 10.71<br>10.71 | 55.36<br>66.07 | 18.75<br>84.82 | 8.93<br>93.75 | 2.68<br>96.43 | 1.79<br>98.21 | 1.79<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |
| TECP | 163 | 1.84<br>1.84 | 12.88<br>14.72 | 21.47<br>36.20 | 19.63<br>55.83 | 17.79<br>73.62 | 9.82<br>83.44 | 6.13<br>89.57 | 2.45<br>92.02 | 3.07<br>95.09 | 3.68<br>98.77 | 1.23<br>100.00 |
| TECA | 180 | 4.44<br>4.44 | 30.00<br>34.44 | 31.11<br>65.56 | 21.11<br>86.67 | 6.11<br>92.78 | 5.00<br>97.78 | 0.56<br>98.33 | 1.11<br>99.44 | 0.56<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |
| CHEP | 196 | 11.22<br>11.22 | 32.14<br>43.37 | 26.02<br>69.39 | 16.84<br>86.22 | 6.12<br>92.35 | 3.06<br>95.41 | 3.06<br>98.47 | 1.02<br>99.49 | 0.51<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |

| VARIABLE | NO. OBS. | MIN. VALUE | MEDIAN VALUE | MAX. VALUE | ARITH. MEAN | GEOM. MEAN | STD. DEV. | STD.D. OF LNS |
|---|---|---|---|---|---|---|---|---|
| FRMP | 234 | 10.8000 | 48.4500 | 175.5000 | 53.3759 | 47.3796 | 26.7759 | 0.4966 |
| TEAF | 230 | 1.3000 | 22.4000 | 73.9000 | 25.2844 | 22.2758 | 12.7826 | 0.5257 |
| CHRF | 230 | 7.4118 | 30.7647 | 93.6470 | 33.6308 | 30.2131 | 15.5358 | 0.4747 |
| CHMC | 232 | 7.6824 | 29.2941 | 87.2941 | 32.2505 | 29.0779 | 14.5388 | 0.4673 |
| CHESSC | 244 | 6.1000 | 30.8000 | 167.0000 | 33.5204 | 29.6184 | 17.8031 | 0.5030 |
| TGSC | 112 | 6.2000 | 23.8500 | 101.7000 | 29.3517 | 25.4713 | 17.3394 | 0.5242 |
| TECP | 163 | 8.7000 | 55.1000 | 155.3000 | 61.6573 | 53.4730 | 32.8415 | 0.5526 |
| TECA | 180 | 10.1000 | 37.7500 | 120.4000 | 40.5553 | 36.2761 | 19.9318 | 0.4765 |
| CHEP | 196 | 4.3000 | 32.8500 | 123.7000 | 37.9333 | 31.8121 | 22.5787 | 0.6168 |

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SUMMARY STATISTICS   ST. LOUIS -SITE 901  SCREENED NO2 DATA

VARIABLE     NO.                         FREQUENCY DISTRIBUTION
             OBS.    <= 15.  15.- 30.  30.- 45.  45.- 60.  60.- 75.  75.- 90.  90.-105. 105.-120. 120.-135. 135.-150.    >150

  PRMF       244      0.0       0.0       1.23      8.61     25.41     24.59     15.16     12.30      5.33      2.87      4.51
                      0.0       0.0       1.23      9.84     35.25     59.84     75.00     87.30     92.62     95.49    100.00

  TEAF       246      0.0      21.95     36.59     28.05     10.57      2.44      0.41      0.0       0.0       0.0       0.0
                      0.0      21.95     58.54     86.59     97.15     99.59    100.00    100.00    100.00    100.00    100.00

  CHRF       245      0.0       3.67     24.08     33.06     21.22      8.57      6.53      2.45      0.41      0.0       0.0
                      0.0       3.67     27.76     60.82     82.04     90.61     97.14     99.59    100.00    100.00    100.00

  CHRC       242      0.0       4.96     28.93     32.23     21.49      7.02      4.13      0.83      0.41      0.0       0.0
                      0.0       4.96     33.88     66.12     87.60     94.63     98.76     99.59    100.00    100.00    100.00

 CHESSC      206      0.49      2.91     15.05     20.87     22.33     13.59     14.08      4.85      3.88      0.49      1.46
                      0.49      3.40     18.45     39.32     61.65     75.24     89.32     94.17     98.06     98.54    100.00

  TGBC       123      0.0      33.33     43.09     12.20      4.07      1.63      1.63      2.44      0.81      0.0       0.81
                      0.0      33.33     76.42     88.62     92.68     94.31     95.93     98.37     99.19     99.19    100.00

  TECA        28      0.0       7.14     21.43     21.43     25.00     14.29      3.57      3.57      0.0       0.0       3.57
                      0.0       7.14     28.57     50.00     75.00     89.29     92.86     96.43     96.43     96.43    100.00

  CHEM        46      0.0       0.0       2.17     26.09     23.91     19.57      8.70     15.22      4.35      0.0       0.0
                      0.0       0.0       2.17     28.26     52.17     71.74     80.43     95.65    100.00    100.00    100.00

VARIABLE     NO.        MIN.       MEDIAN        MAX.       ARITH.       GEOM.        STD.      STD.D.
             OBS.       VALUE      VALUE         VALUE        MEAN         MEAN         DEV.      OF LNS

  PRMF       244      41.0000     82.9500     186.8000     89.6557      85.9590      27.6980     0.2941
  TEAF       246      17.8000     41.1000      96.8000     43.1875      40.7797      14.7617     0.3418
  CHRF       245      27.7647     54.9412     133.5294     58.5012      55.1836      20.6768     0.3411
  CHRC       242      24.5882     52.2941     129.2941     54.9227      52.1567      18.1547     0.3218
 CHESSC      206      12.4000     67.2500     259.0000     71.4223      65.6409      29.8274     0.4236
  TGBC       123      17.3000     35.6000     160.5000     41.4565      37.4644      22.5623     0.4227
  TECA        28      27.2000     58.6500     170.9000     63.4035      58.0194      25.6093     0.4215
  CHEM        46      43.9000     71.6000     130.1000     78.0542      74.8225      23.1227     0.2937
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SUMMARY STATISTICS   ST. LOUIS -SITE 902   SCREENED NO2 DATA

| VARIABLE | NO. OBS. | <= 15. | 15.- 30. | 30.- 45. | 45.- 60. | 60.- 75. | 75.- 90. | 90.-105. | 105.-120. | 120.-135. | 135.-150. | >150 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FREQUENCY DISTRIBUTION | | | | | | | | | | |
| PRMF | 244 | 0.0<br>0.0 | 2.87<br>2.87 | 7.79<br>10.66 | 23.36<br>34.02 | 25.82<br>59.84 | 17.21<br>77.05 | 11.48<br>88.52 | 4.92<br>93.44 | 3.28<br>96.72 | 1.23<br>97.95 | 2.05<br>100.00 |
| TEAP | 242 | 2.07<br>2.07 | 36.78<br>38.84 | 41.74<br>80.58 | 14.46<br>95.04 | 2.48<br>97.52 | 1.65<br>99.17 | 0.41<br>99.59 | 0.41<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |
| CHRF | 244 | 0.41<br>0.41 | 19.26<br>19.67 | 41.39<br>61.07 | 24.59<br>85.66 | 6.56<br>92.21 | 4.10<br>96.31 | 2.87<br>99.18 | 0.0<br>99.18 | 0.0<br>99.18 | 0.82<br>100.00 | 0.0<br>100.00 |
| CHRC | 243 | 0.82<br>0.82 | 24.69<br>25.51 | 38.68<br>64.20 | 22.63<br>86.83 | 7.82<br>94.65 | 3.70<br>98.35 | 0.82<br>99.18 | 0.0<br>99.18 | 0.82<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |
| CHESBC | 203 | 2.96<br>2.96 | 14.29<br>17.24 | 25.12<br>42.36 | 20.69<br>63.05 | 16.26<br>79.31 | 8.87<br>88.18 | 3.94<br>92.12 | 3.85<br>95.97 | 2.06<br>98.03 | 0.0<br>98.03 | 1.97<br>100.00 |
| TGBC | 118 | 3.39<br>3.39 | 53.39<br>56.78 | 29.66<br>86.44 | 10.17<br>96.61 | 2.54<br>99.15 | 0.0<br>99.15 | 0.0<br>99.15 | 0.85<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |
| TECO | 85 | 0.0<br>0.0 | 12.94<br>12.94 | 29.41<br>42.35 | 41.18<br>83.53 | 12.94<br>96.47 | 2.35<br>98.82 | 1.18<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |
| CHEM | 102 | 1.96<br>1.96 | 16.67<br>18.63 | 35.29<br>53.92 | 24.51<br>78.43 | 15.69<br>94.12 | 5.88<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |

| VARIABLE | NO. OBS. | MIN. VALUE | MEDIAN VALUE | MAX. VALUE | ARITH. MEAN | GEOM. MEAN | STD. DEV. | STD.D. OF LNS |
|---|---|---|---|---|---|---|---|---|
| PRMF | 244 | 25.0000 | 67.6500 | 226.5000 | 73.4972 | 68.4358 | 29.6031 | 0.3775 |
| TEAP | 242 | 7.5000 | 32.7000 | 118.4000 | 35.5810 | 32.9669 | 14.8225 | 0.3908 |
| CHRF | 244 | 11.8824 | 40.4706 | 145.2941 | 44.1286 | 40.5486 | 19.5689 | 0.4083 |
| CHRC | 243 | 10.8235 | 39.1765 | 121.7647 | 42.3852 | 39.2827 | 17.4362 | 0.3893 |
| CHESBC | 203 | 6.2000 | 50.5000 | 195.2000 | 56.6636 | 49.0444 | 31.3004 | 0.5573 |
| TGBC | 118 | 13.8000 | 27.9000 | 106.7000 | 31.6389 | 29.2736 | 14.0326 | 0.3823 |
| TECO | 85 | 15.8000 | 46.5000 | 100.2000 | 47.4980 | 45.0060 | 15.1399 | 0.3407 |
| CHEM | 102 | 8.8000 | 43.9500 | 89.8000 | 45.8886 | 42.5763 | 16.8117 | 0.4106 |

A-5

SUMMARY STATISTICS CALIFORNIA-SITE 831 SCREENED NO2 DATA

| VARIABLE | NO. OBS. | FREQUENCY DISTRIBUTION<br><= 15. | 15.- 30. | 30.- 45. | 45.- 60. | 60.- 75. | 75.- 90. | 90.-105. | 105.-120. | 120.-135. | 135.-150. | >150 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FRMF | 56 | 1.79<br>1.79 | 12.50<br>14.29 | 10.71<br>25.00 | 12.50<br>37.50 | 19.64<br>57.14 | 12.50<br>69.64 | 10.71<br>80.36 | 8.93<br>89.29 | 5.36<br>94.64 | 0.0<br>94.64 | 5.36<br>100.00 |
| TEAF | 54 | 1.85<br>1.85 | 25.93<br>27.78 | 24.07<br>51.85 | 25.93<br>77.78 | 14.81<br>92.59 | 3.70<br>96.30 | 3.70<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |
| CHRF | 57 | 0.0<br>0.0 | 17.54<br>17.54 | 22.81<br>40.35 | 17.54<br>57.89 | 22.81<br>80.70 | 10.53<br>91.23 | 3.51<br>94.74 | 1.75<br>96.49 | 1.75<br>98.25 | 1.75<br>100.00 | 0.0<br>100.00 |
| CHRC | 55 | 1.82<br>1.82 | 18.18<br>20.00 | 25.45<br>45.45 | 21.82<br>67.27 | 14.55<br>81.82 | 12.73<br>94.55 | 0.0<br>94.55 | 1.82<br>96.36 | 3.64<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |
| CHESSC | 143 | 4.90<br>4.90 | 15.38<br>20.28 | 23.78<br>44.06 | 14.69<br>58.74 | 18.88<br>77.62 | 9.09<br>86.71 | 7.69<br>94.41 | 2.80<br>97.20 | 1.40<br>98.60 | 0.70<br>99.30 | 0.70<br>100.00 |
| TGSC | 11 | 0.0<br>0.0 | 9.09<br>9.09 | 9.09<br>18.18 | 27.27<br>45.45 | 9.09<br>54.55 | 18.18<br>72.73 | 9.09<br>81.82 | 18.18<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |
| TEC4 | 25 | 0.0<br>0.0 | 4.00<br>4.00 | 8.00<br>12.00 | 24.00<br>36.00 | 8.00<br>44.00 | 20.00<br>64.00 | 8.00<br>72.00 | 16.00<br>88.00 | 8.00<br>96.00 | 4.00<br>100.00 | 0.0<br>100.00 |
| CHEM | 45 | 0.0<br>0.0 | 8.89<br>8.89 | 24.44<br>33.33 | 13.33<br>46.67 | 20.00<br>66.67 | 13.33<br>80.00 | 6.67<br>86.67 | 4.44<br>91.11 | 2.22<br>93.33 | 0.0<br>93.33 | 6.67<br>100.00 |

| VARIABLE | NO. OBS. | MIN. VALUE | MEDIAN VALUE | MAX. VALUE | ARITH. MEAN | GEOM. MEAN | STD. DEV. | STD.D. OF LNS |
|---|---|---|---|---|---|---|---|---|
| FRMF | 56 | 11.1000 | 70.1000 | 165.1000 | 72.9981 | 62.4755 | 37.3652 | 0.6095 |
| TEAF | 54 | 11.5000 | 41.1000 | 93.2000 | 44.5258 | 39.4556 | 20.8791 | 0.5190 |
| CHRF | 57 | 19.5294 | 53.6470 | 145.4118 | 56.2187 | 49.9601 | 27.4734 | 0.4996 |
| CHRC | 55 | 7.6471 | 50.4706 | 134.4706 | 51.9186 | 45.3600 | 26.7115 | 0.5502 |
| CHESSC | 143 | 3.5000 | 48.3000 | 196.3000 | 55.4333 | 47.0902 | 30.4864 | 0.6102 |
| TGSC | 11 | 16.3000 | 68.4000 | 112.6000 | 68.5999 | 59.8126 | 32.7410 | 0.5990 |
| TEC4 | 25 | 27.1000 | 79.7000 | 136.4000 | 79.8719 | 73.2952 | 31.7977 | 0.4801 |
| CHEM | 45 | 23.0000 | 62.9000 | 234.4000 | 69.3666 | 60.2519 | 40.7411 | 0.5291 |

SUMMARY STATISTICS CALIFORNIA-SITE 032 SCREENED NO2 DATA

| VARIABLE | NO. OBS. | FREQUENCY DISTRIBUTION <= 15. | 15.- 30. | 30.- 45. | 45.- 60. | 60.- 75. | 75.- 90. | 90.-105. | 105.-120. | 120.-135. | 135.-150. | >150 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRMF | 202 | 0.99<br>0.99 | 1.49<br>2.48 | 4.46<br>6.93 | 3.96<br>10.89 | 10.89<br>21.78 | 13.37<br>35.15 | 15.84<br>50.99 | 13.37<br>64.36 | 8.42<br>72.77 | 5.94<br>78.71 | 21.29<br>100.00 |
| TEAP | 182 | 3.30<br>3.30 | 13.19<br>16.48 | 29.12<br>45.60 | 22.53<br>68.13 | 13.74<br>81.87 | 6.59<br>88.46 | 5.49<br>93.96 | 1.65<br>95.60 | 3.85<br>99.45 | 0.0<br>99.45 | 0.55<br>100.00 |
| CHRF | 219 | 0.91<br>0.91 | 6.39<br>7.31 | 15.98<br>23.29 | 24.66<br>47.95 | 21.46<br>69.41 | 11.42<br>80.82 | 6.39<br>87.21 | 5.94<br>93.15 | 3.65<br>96.80 | 1.37<br>98.17 | 1.83<br>100.00 |
| CHRC | 195 | 1.03<br>1.03 | 6.15<br>7.18 | 19.49<br>26.67 | 27.69<br>54.36 | 18.97<br>73.33 | 8.72<br>82.05 | 7.69<br>89.74 | 4.10<br>93.85 | 3.08<br>96.92 | 1.54<br>98.46 | 1.54<br>100.00 |
| CHESSC | 232 | 1.29<br>1.29 | 6.90<br>8.19 | 16.81<br>25.00 | 17.67<br>42.67 | 13.79<br>56.47 | 16.81<br>73.28 | 9.91<br>83.19 | 3.45<br>86.64 | 4.31<br>90.95 | 1.72<br>92.67 | 7.33<br>100.00 |
| TGSC | 105 | 0.95<br>0.95 | 6.67<br>7.62 | 35.24<br>42.86 | 23.81<br>66.67 | 15.24<br>81.90 | 2.86<br>84.76 | 3.81<br>68.57 | 7.62<br>96.19 | 0.95<br>97.14 | 1.90<br>99.05 | 0.95<br>100.00 |
| TECA | 143 | 0.0<br>0.0 | 0.70<br>0.70 | 8.39<br>9.09 | 15.38<br>24.47 | 11.19<br>35.66 | 13.99<br>49.65 | 13.29<br>62.94 | 13.99<br>76.92 | 6.99<br>83.92 | 4.90<br>88.81 | 11.19<br>100.00 |
| CHEM | 134 | 0.0<br>0.0 | 7.46<br>7.46 | 11.19<br>18.66 | 11.94<br>30.60 | 21.64<br>52.24 | 9.70<br>61.94 | 12.69<br>74.63 | 6.72<br>81.34 | 4.48<br>85.82 | 5.22<br>91.04 | 8.96<br>100.00 |

| VARIABLE | NO. OBS. | MIN. VALUE | MEDIAN VALUE | MAX. VALUE | ARITH. MEAN | GEOM. MEAN | STD. DEV. | STD.D. OF LNS |
|---|---|---|---|---|---|---|---|---|
| PRMF | 202 | 9.0000 | 104.3000 | 385.8999 | 113.9052 | 101.2553 | 53.6198 | 0.5211 |
| TEAP | 182 | 2.4000 | 48.1000 | 200.5000 | 54.0091 | 46.8515 | 26.9251 | 0.5643 |
| CHRF | 219 | 4.2353 | 61.7647 | 237.1765 | 67.5576 | 60.4136 | 32.2191 | 0.4969 |
| CHRC | 195 | 1.2941 | 57.2941 | 240.3529 | 64.5871 | 57.0463 | 32.0920 | 0.5061 |
| CHESSC | 232 | 7.2000 | 66.7500 | 303.5999 | 76.3985 | 65.3987 | 45.1246 | 0.5706 |
| TGSC | 105 | 11.6000 | 51.8000 | 179.7000 | 57.5367 | 50.8811 | 30.6851 | 0.4932 |
| TECA | 143 | 27.1000 | 90.9000 | 326.2000 | 99.3199 | 89.3018 | 52.0251 | 0.4820 |
| CHEM | 134 | 16.3000 | 72.5000 | 234.8000 | 84.4474 | 73.6524 | 44.2720 | 0.5407 |

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SUMMARY STATISTICS   CALIFORNIA-SITE 8320 SCREENED NO2 DATA

VARIABLE     NO.                              FREQUENCY DISTRIBUTION
             OBS.   <= 15.  15.- 30.  30.- 45.  45.- 60.  60.- 75.  75.- 90.  90.-105.  105.-120.  120.-135.  135.-150.   >150

  PRMF       143     0.0     0.70      2.80      7.69      9.09     13.99     18.88     10.49      8.39      6.99     20.98
                     0.0     0.70      3.50     11.19     20.28     34.27     53.15     63.64     72.03     79.02    100.00
  TEAF       139     0.72    6.47     20.86     28.78     20.86      6.47      4.32      2.88      3.60      2.16      2.88
                     0.72    7.19     28.06     56.83     77.70     84.17     88.49     91.37     94.96     97.12    100.00
  CHMF       157     0.64    0.64      7.01     24.84     24.84     14.01     11.06      5.73      3.18      2.55      5.10
                     0.64    1.27      8.28     33.12     57.96     71.97     83.44     89.17     92.36     94.90    100.00
  CHRC       145     0.0     0.69      8.28     28.28     28.28     16.55      8.97      3.45      0.0       2.07      3.45
                     0.0     0.69      8.97     37.24     65.52     82.07     91.03     94.48     94.48     96.55    100.00
  CHESSL     149     0.67    4.03      9.40     16.11     17.45     18.12     12.75      5.37      3.36      2.01     10.74
                     0.67    4.70     14.09     30.20     47.65     65.77     78.52     83.89     87.25     89.26    100.00
  TOBC        83     0.0     7.23     25.30     21.69     18.07     13.25      4.82      3.61      1.20      1.20      3.61
                     0.0     7.23     32.53     54.22     72.29     85.54     90.36     93.98     95.18     96.39    100.00
  TECG        69     0.0     0.0      14.49     21.74     13.04     13.04      8.70      8.70      7.25      2.90     10.14
                     0.0     0.0      14.49     36.23     49.28     62.32     71.01     79.71     86.96     89.86    100.00
  CHEM        66     0.0     3.03     13.64     12.12     10.61     13.64     13.64      6.06      7.58      4.55     15.15
                     0.0     3.03     16.67     28.79     39.39     53.03     66.67     72.73     80.30     84.85    100.00

VARIABLE     NO.        MIN.       MEDIAN       MAX.       ARITH.      GEOM.       STD.      STD.D.
             OBS.       VALUE      VALUE        VALUE      MEAN        MEAN        DEV.      OF LNS

  PRMF       143      20.3000    102.2000    250.8999    111.6755    102.4479    46.0074    0.4297
  TEAF       139       3.6000     54.2000    197.0000     64.5170     57.2373    34.2093    0.5029
  CHMF       157       5.8824     69.7647    263.0586     80.1485     72.8674    37.9522    0.4460
  CHRC       145      22.5882     67.1765    228.0000     73.2068     67.8569    32.5340    0.3766
  CHESSL     149       8.8000     76.5000    300.3999     85.4678     74.2449    46.6342    0.5502
  TOBC        83      16.8000     57.3000    193.4000     64.3766     57.6076    32.6026    0.4724
  TECG        69      34.0000     77.4000    268.7000     89.9732     78.6620    51.7120    0.5076
  CHEM        66      23.1000     87.3500    305.3999    100.9219     85.3997    62.4853    0.5810
```

SUMMARY STATISTICS CALIFORNIA-SITE 041 SCREENED NO2 DATA

| VARIABLE | NO. OBS. | FREQUENCY DISTRIBUTION <= 15. | 15.- 30. | 30.- 45. | 45.- 60. | 60.- 75. | 75.- 90. | 90.-105. | 105.-120. | 120.-135. | 135.-150. | >150 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FRMF | 203 | 1.97<br>1.97 | 3.94<br>5.91 | 12.32<br>18.23 | 16.26<br>34.48 | 16.26<br>50.74 | 15.76<br>66.50 | 12.32<br>78.82 | 8.37<br>87.19 | 6.40<br>93.60 | 1.97<br>95.57 | 4.43<br>100.00 |
| TEAF | 187 | 4.28<br>4.28 | 20.32<br>24.60 | 31.55<br>56.15 | 21.93<br>78.07 | 11.76<br>89.84 | 6.42<br>96.26 | 2.14<br>98.40 | 0.53<br>98.93 | 1.07<br>100.00 | 0.0<br>100.00 | 0.0<br>100.00 |
| CMRF | 207 | 3.38<br>3.38 | 10.63<br>14.01 | 20.29<br>34.30 | 22.22<br>56.52 | 24.15<br>80.68 | 9.18<br>89.86 | 5.31<br>95.17 | 3.38<br>98.55 | 0.97<br>99.52 | 0.48<br>100.00 | 0.0<br>100.00 |
| CMRC | 198 | 2.02<br>2.02 | 10.61<br>12.63 | 21.72<br>34.34 | 24.75<br>59.09 | 16.16<br>75.25 | 14.65<br>89.90 | 6.06<br>95.96 | 3.54<br>99.49 | 0.0<br>99.49 | 0.0<br>99.49 | 0.51<br>100.00 |
| CHESSC | 201 | 1.00<br>1.00 | 8.96<br>9.95 | 17.91<br>27.86 | 25.37<br>53.23 | 17.41<br>70.65 | 11.94<br>82.59 | 5.47<br>88.06 | 5.47<br>93.53 | 2.99<br>96.52 | 0.50<br>97.01 | 2.99<br>100.00 |
| TGSC | 101 | 5.94<br>5.94 | 25.74<br>31.68 | 25.74<br>57.43 | 15.84<br>73.27 | 12.87<br>86.14 | 4.95<br>91.09 | 5.94<br>97.03 | 0.0<br>97.03 | 0.99<br>98.02 | 0.0<br>98.02 | 1.98<br>100.00 |
| TECA | 105 | 0.95<br>0.95 | 1.90<br>2.86 | 4.76<br>7.62 | 14.29<br>21.90 | 17.14<br>39.05 | 17.14<br>56.19 | 16.19<br>72.38 | 9.52<br>81.90 | 3.81<br>85.71 | 4.76<br>90.48 | 9.52<br>100.00 |
| CHEM | 119 | 0.84<br>0.84 | 2.52<br>3.36 | 5.88<br>9.24 | 14.29<br>23.53 | 17.65<br>41.18 | 18.49<br>59.66 | 15.13<br>74.79 | 6.72<br>81.51 | 5.88<br>87.39 | 2.52<br>89.92 | 10.08<br>100.00 |

| VARIABLE | NO. OBS. | MIN. VALUE | MEDIAN VALUE | MAX. VALUE | ARITH. MEAN | GEOM. MEAN | STD. DEV. | STD.D. OF LNS |
|---|---|---|---|---|---|---|---|---|
| FRMF | 203 | 7.3000 | 75.0000 | 168.1000 | 78.4998 | 70.0556 | 34.5045 | 0.5180 |
| TEAF | 187 | 1.3000 | 42.5000 | 129.7000 | 45.6803 | 39.5129 | 22.3455 | 0.6120 |
| CMRF | 207 | 2.7059 | 55.8824 | 141.7647 | 56.9733 | 50.0300 | 25.5297 | 0.5845 |
| CMRC | 198 | 2.4706 | 55.4117 | 156.7059 | 57.6562 | 51.5018 | 24.6400 | 0.5357 |
| CHESSC | 201 | 5.7000 | 58.0000 | 198.0000 | 64.6[illegible]4 | 57.0260 | 33.0952 | 0.5221 |
| TGSC | 101 | 1.2000 | 40.4000 | 168.4000 | 46.9303 | 37.4651 | 29.9221 | 0.7793 |
| TECA | 105 | 8.3000 | 85.1600 | 223.3000 | 90.0762 | 81.4186 | 38.9269 | 0.4846 |
| CHEM | 119 | 5.0000 | 78.9000 | 216.2000 | 87.4076 | 78.4857 | 38.0464 | 0.5072 |

# APPENDIX B. SUMMARY STATISTICS FOR DAILY DATA BEFORE REMOVING OUTLIERS

Tables B-1 through B-4 give summary statistics for the nine monitoring methods by site and over sites before RTI removed any outliers. The corresponding tables in the text after removing outliers are Tables 4.14 (B-1), 4.9 (B-2), 4.8 (B-3) and 4.11 (B-4). RTI's procedure for removing outliers is given in Section 4.3.

## Table B-1

## Means of Daily Measurements by Method and Site Before Removing Outliers--Sampling Period July 1, 1972, - April 30, 1973, Unpaired Data

| | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSO | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| CHATT. | | | | | | | | | |
| 632 | 56.8 | 27.9 | 34.8 | 34.6 | 33.5 | 27.2 | 52.5 | 48.3 | 41.8 |
| 633 | 53.4 | 25.3 | 33.5 | 32.2 | 33.3 | 29.4 | 62.4 | 40.6 | 37.9 |
| St. Louis | | | | | | | | | |
| 901 | 90.8 | 43.2 | 58.5 | 53.8 | 72.3 | 41.5 | * | 63.4 | 78.1 |
| 902 | 73.5 | 35.6 | 44.1 | 42.4 | 56.4 | 31.6 | * | 47.5 | 45.9 |
| Calif. | | | | | | | | | |
| 831[1] | 73.0 | 44.5 | 56.2 | 51.9 | 55.4 | 68.6 | * | 86.9 | 69.4 |
| 832 | 113.4 | 52.9 | 67.5 | 64.6 | 78.2 | 57.5 | * | 99.3 | 83.8 |
| 841 | 78.3 | 45.3 | 56.2 | 56.4 | 64.4 | 46.0 | * | 93.7 | 86.8 |
| 832D | 111.7 | 64.1 | 82.1 | 73.2 | 85.4 | 63.7 | * | 90.0 | 100.9 |

* = no data present.

[1] On October 6, 1972, all methods except CHESSO and CHEM moved from site 831 to site 832.

## Table B-2

## Correlations Between Methods - Over Sites[1], Before and After Removing Outliers

| | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSO | TECH[2] | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| FRMF | | .81 | .77 | .79 | .59 | .69 | .55 | .71 | .69 |
| TEAF | .77 | | .85 | .86 | .61 | .76 | .73 | .76 | .76 |
| CHRF | .75 | .82 | | .93 | .62 | .80 | .71 | .72 | .73 |
| CHRO | .75 | .83 | .91 | | .59 | .79 | .68 | .75 | .74 |
| CHESSO | .54 | .56 | .57 | .54 | | .50 | .29 | .65 | .60 |
| TGSO | .67 | .73 | .81 | .78 | .46 | | .54 | .72 | .73 |
| TECH | .45 | .70 | .68 | .61 | .25 | .51 | | .56 | .64 |
| TEC4 | .57 | .65 | .65 | .68 | .56 | .62 | .55 | | .83 |
| CHEM | .61 | .72 | .70 | .70 | .59 | .67 | .62 | .75 | |

OUTLIERS OUT

OUTLIERS IN

[1] Sites = 632, 633, 901, 902, 831, 832, 841

[2] Data for TECH from sites 632 and 633 only

## Table B-3

### Summary Statistics for Paired Observations--
### for Data Combined over Sites[1], before Removing Outliers[2]

| | | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSO | TECH[3] | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|---|
| FRMF | N | 1415 | 1306 | 1350 | 1327 | 1187 | 653 | 268 | 646 | 585 |
| | FRMF MEAN | 76.9 | 75.2 | 76.7 | 76.1 | 75.8 | 80.7 | 56.8 | 73.3 | 75.1 |
| | Col. MEAN | | 38.0 | 48.9 | 46.8 | 55.4 | 38.8 | 56.8 | 63.1 | 59.3 |
| | Ratio | | 1.98 | 1.56 | 1.63 | 1.37 | 2.08 | 1.00 | 1.16 | 1.27 |
| | Corr. | | .77 | .75 | .75 | .55 | .67 | .45 | .58 | .61 |
| TEAF | N | 1306 | 1377 | 1322 | 1298 | 1161 | 633 | 268 | 628 | 572 |
| | TEAF MEAN | 38.0 | 38.0 | 37.9 | 37.8 | 37.2 | 38.1 | 28.0 | 35.4 | 37.0 |
| | Col. MEAN | 75.2 | | 48.5 | 46.4 | 54.3 | 37.7 | 57.1 | 60.5 | 57.2 |
| | Ratio | .51 | | .78 | .81 | .69 | 1.01 | .49 | .59 | .65 |
| | Corr. | .77 | | .83 | .83 | .56 | .74 | .71 | .65 | .71 |
| CHRF | N | 1350 | 1322 | 1431 | 1336 | 1199 | 653 | 269 | 661 | 598 |
| | CHRF MEAN | 48.9 | 48.5 | 49.3 | 48.9 | 48.2 | 47.3 | 32.0 | 46.4 | 48.4 |
| | Col. MEAN | 76.7 | 37.9 | | 46.8 | 55.5 | 38.7 | 57.3 | 63.5 | 59.2 |
| | Ratio | .64 | 1.28 | | 1.04 | .87 | 1.22 | .56 | .73 | .82 |
| | Corr. | .75 | .83 | | .91 | .57 | .81 | .68 | .65 | .71 |
| CHRO | N | 1327 | 1298 | 1336 | 1401 | 1186 | 639 | 272 | 648 | 581 |
| | CHRO MEAN | 46.8 | 46.4 | 46.8 | 47.1 | 46.1 | 46.4 | 32.6 | 43.8 | 46.2 |
| | Col. MEAN | 76.1 | 37.8 | 48.9 | | 55.0 | 38.6 | 57.0 | 62.7 | 58.6 |
| | Ratio | .61 | 1.23 | .96 | | .84 | 1.20 | .57 | .70 | .79 |
| | Corr. | .75 | .83 | .91 | | .54 | .78 | .61 | .68 | .71 |

Table B-3 (Continued)

| | | FRMF | TEAF | CHRF | CFRO | CHESSO | TGSO | TECH[2/] | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|---|
| CHESSO | N | 1187 | 1161 | 1199 | 1186 | 1490 | 565 | 265 | 642 | 581 |
| | CHESSO MEAN | 55.4 | 54.3 | 55.5 | 55.0 | 55.4 | 60.7 | 35.1 | 50.9 | 54.0 |
| | Col. MEAN | 75.8 | 37.2 | 48.2 | 46.1 | | 38.6 | 56.0 | 63.6 | 60.0 |
| | Ratio | .73 | 1.45 | 1.15 | 1.19 | | 1.57 | .63 | .80 | .90 |
| | Corr. | .55 | .56 | .57 | .54 | | .46 | .25 | .56 | .59 |
| TGSO | N | 653 | 633 | 653 | 639 | 565 | 686 | 192 | 306 | 315 |
| | TGSO MEAN | 38.8 | 37.7 | 38.7 | 38.6 | 38.6 | 39.0 | 28.8 | 39.3 | 37.3 |
| | Col. MEAN | 80.7 | 38.1 | 47.3 | 46.4 | 60.7 | | 56.8 | 68.2 | 58.3 |
| | Ratio | .48 | .99 | .82 | .83 | .64 | | .51 | .58 | .64 |
| | Corr. | .67 | .74 | .81 | .78 | .46 | | .51 | .62 | .68 |
| TECH | N | 268 | 268 | 269 | 272 | 265 | 192 | 328 | 228 | 181 |
| | TECH MEAN | 56.8 | 57.1 | 57.3 | 57.0 | 56.0 | 56.8 | 57.5 | 59.7 | 58.7 |
| | Col. MEAN | 56.8 | 28.0 | 32.0 | 32.6 | 35.1 | 28.8 | | 44.6 | 45.1 |
| | Ratio | 1.00 | 2.04 | 1.79 | 1.75 | 1.59 | 1.96 | | 1.34 | 1.30 |
| | Corr. | .45 | .71 | .68 | .61 | .25 | .51 | | .55 | .70 |
| TEC4 | N | 646 | 628 | 661 | 648 | 642 | 306 | 228 | 753 | 524 |
| | TEC4 MEAN | 63.1 | 60.5 | 63.5 | 62.7 | 63.6 | 68.2 | 44.6 | 64.3 | 65.9 |
| | Col. MEAN | 73.3 | 35.4 | 46.4 | 43.8 | 50.9 | 39.3 | 59.7 | | 61.0 |
| | Ratio | .86 | 1.69 | 1.37 | 1.43 | 1.25 | 1.72 | .75 | | 1.08 |
| | Corr. | .58 | .65 | .65 | .68 | .56 | .62 | .55 | | .75 |

Table B-3 (Continued)

| | | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSO | TECH[2] | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|---|
| CHEM | N | 585 | 572 | 598 | 581 | 581 | 315 | 181 | 524 | 754 |
| | CHEM MEAN | 59.3 | 57.2 | 59.2 | 58.6 | 60.0 | 58.3 | 45.1 | 61.0 | 60.6 |
| | Col. MEAN | 75.1 | 37.0 | 48.4 | 46.2 | 54.0 | 37.3 | 58.7 | 65.9 | |
| | Ratio | .79 | 1.54 | 1.22 | 1.27 | 1.11 | 1.56 | .77 | .93 | |
| | Corr. | .61 | .71 | .71 | .71 | .59 | .68 | .70 | .75 | |

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[1] Unless otherwise indicated, data is from sites = 632, 633, 901, 902, 831, 832, and 841.

[2] The statistics in this table are shown for descriptive purposes only. Their general use is not recommended (see Section 5.4).

[3] Data for TECH from sites 632 and 633 only.

## Table B-4

## Correlations Between Methods - By Site, Before Removing Outliers

| Method | Site | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSO | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|---|
| FRMF | 632 | 1.0 | .67 | .47 | .52 | .31 | .26 | .27 | .22 | .37 |
| | 633 | 1.0 | .72 | .58 | .67 | .43 | .29 | .60 | .43 | .43 |
| | 901 | 1.0 | .72 | .71 | .69 | .32 | .57 | --- | .63 | .59 |
| | 902 | 1.0 | .74 | .66 | .74 | .37 | .25 | --- | .61 | .50 |
| | 831 | 1.0 | .74 | .78 | .73 | .65 | .87* | --- | .33* | .09* |
| | 832 | 1.0 | .79 | .78 | .75 | .48 | .82 | --- | .65 | .69 |
| | 832D | 1.0 | .71 | .56 | .67 | .27 | .63 | --- | .67 | .62 |
| | 841 | 1.0 | .62 | .71 | .65 | .47 | .75 | --- | .34 | .34 |
| TEAF | 632 | .67 | 1.0 | .67 | .68 | .44 | .54 | .60 | .39 | .64 |
| | 633 | .72 | 1.0 | .73 | .77 | .46 | .63 | .82 | .60 | .71 |
| | 901 | .72 | 1.0 | .79 | .77 | .35 | .62 | --- | .72 | .82 |
| | 902 | .74 | 1.0 | .83 | .84 | .49 | .52 | --- | .77 | .73 |
| | 831 | .74 | 1.0 | .85 | .81 | .71 | .80* | --- | .43* | .46* |
| | 832 | .79 | 1.0 | .87 | .88 | .46 | .85 | --- | .68 | .72 |
| | 832D | .71 | 1.0 | .77 | .89 | .38 | .88 | --- | .92 | .84 |
| | 841 | .62 | 1.0 | .68 | .66 | .49 | .68 | --- | .57 | .38 |
| CHRF | 632 | .47 | .67 | 1.0 | .79 | .26 | .63 | .57 | .35 | .54 |
| | 633 | .58 | .73 | 1.0 | .86 | .39 | .66 | .76 | .54 | .51 |
| | 901 | .71 | .79 | 1.0 | .91 | .36 | .68 | --- | .65 | .73 |
| | 902 | .66 | .83 | 1.0 | .93 | .42 | .62 | --- | .78 | .66 |
| | 831 | .78 | .85 | 1.0 | .95 | .68 | .54* | --- | .62* | .79* |
| | 832 | .78 | .87 | 1.0 | .94 | .49 | .89 | --- | .61 | .65 |
| | 832D | .56 | .77 | 1.0 | .88 | .37 | .86 | --- | .83 | .77 |
| | 841 | .71 | .68 | 1.0 | .81 | .54 | .84 | --- | .64 | .49 |
| CHRO | 632 | .52 | .68 | .79 | 1.0 | .25 | .55 | .46 | .36 | .46 |
| | 633 | .67 | .77 | .86 | 1.0 | .39 | .60 | .76 | .52 | .53 |
| | 901 | .69 | .77 | .91 | 1.0 | .35 | .67 | --- | .73 | .73 |
| | 902 | .74 | .84 | .93 | 1.0 | .41 | .57 | --- | .75 | .60 |
| | 831 | .73 | .81 | .95 | 1.0 | .73 | .90* | --- | .75* | .81* |
| | 832 | .75 | .88 | .94 | 1.0 | .44 | .89 | --- | .69 | .70 |
| | 832D | .67 | .89 | .88 | 1.0 | .42 | .83 | --- | .78 | .74 |
| | 841 | .65 | .66 | .81 | 1.0 | .48 | .73 | --- | .64 | .44 |
| CHESSO | 632 | .31 | .44 | .26 | .25 | 1.0 | .14 | .14 | .20 | .32 |
| | 633 | .43 | .46 | .39 | .39 | 1.0 | .13 | .34 | .17 | .32 |
| | 901 | .32 | .35 | .36 | .35 | 1.0 | .23 | --- | .48 | .43 |
| | 902 | .37 | .49 | .42 | .41 | 1.0 | .10 | --- | .35 | .45 |
| | 831 | .65 | .71 | .68 | .73 | 1.0 | .80 | --- | -.02* | .40* |
| | 832 | .48 | .46 | .49 | .44 | 1.0 | .49 | --- | .65 | .48 |
| | 832D | .27 | .38 | .37 | .42 | 1.0 | .39 | --- | .74 | .70 |
| | 841 | .47 | .49 | .54 | .48 | 1.0 | .46 | --- | .32 | .50 |

Table B-4 (Continued)

| Method | Site | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSO | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|---|
| TGSO | 632 | .26 | .54 | .63 | .55 | .14 | 1.0 | .42 | .37 | .41 |
| | 633 | .29 | .63 | .66 | .60 | .13 | 1.0 | .54 | .39 | .55 |
| | 901 | .57 | .62 | .68 | .67 | .23 | 1.0 | --- | .80* | .95* |
| | 902 | .25 | .52 | .62 | .57 | .10 | 1.0 | --- | .76 | .39 |
| | 831 | .87* | .80* | .54* | .90* | .80 | 1.0 | --- | -.36* | --- |
| | 832 | .82 | .85 | .89 | .89 | .49 | 1.0 | --- | .79 | .88 |
| | 832D | .63 | .88 | .86 | .83 | .39 | 1.0 | --- | .85 | .85 |
| | 841 | .75 | .68 | .84 | .73 | .46 | 1.0 | --- | .84 | .28 |
| TECH | 632 | .29 | .60 | .57 | .46 | .14 | .42 | 1.0 | .55 | .48 |
| | 633 | .60 | .82 | .76 | .76 | .34 | .54 | 1.0 | .66 | .70 |
| TEC4 | 632 | .22 | .39 | .35 | .36 | .20 | .37 | .55 | 1.0 | .70 |
| | 633 | .43 | .60 | .54 | .52 | .17 | .39 | .66 | 1.0 | .50 |
| | 901 | .63 | .72 | .65 | .73 | .48 | .80* | --- | 1.0 | .79 |
| | 902 | .61 | .77 | .78 | .5 | .35 | .76 | --- | 1.0 | .58 |
| | 831 | .33* | .43* | .62* | .75* | -.02* | -.36* | --- | 1.0 | .89* |
| | 832 | .65 | .68 | .61 | .69 | .65 | .79 | --- | 1.0 | .86 |
| | 832D | .67 | .92 | .83 | .78 | .744 | .85 | --- | 1.0 | .96 |
| | 841 | .34 | .57 | .64 | .64 | .32 | .84 | --- | 1.0 | .52 |
| CHEM | 632 | .37 | .64 | .54 | .46 | .32 | .41 | .48 | .70 | 1.0 |
| | 633 | .43 | .71 | .51 | .53 | .38 | .55 | .70 | .50 | 1.0 |
| | 901 | .59 | .82 | .73 | .73 | .43 | .95* | --- | .79 | 1.0 |
| | 902 | .50 | .73 | .66 | .60 | .45 | .39 | --- | .58 | 1.0 |
| | 831 | .09* | .46* | .79* | .81* | .40* | --- | --- | .89* | 1.0 |
| | 832 | .69 | .72 | .65 | .70 | .48 | .88 | --- | .86 | 1.0 |
| | 832D | .62 | .84 | .77 | .74 | .70 | .85 | --- | .96 | 1.0 |
| | 841 | .34 | .38 | .49 | .44 | .50 | .28 | --- | .52 | 1.0 |

* Fewer than 20 readings

# APPENDIX C. ESTIMATED RELATIONSHIPS BETWEEN METHODS BY SITE USING ORTHOGONAL REGRESSION

Appendix Table C-1 presents the results of using orthogonal regression to estimate the linear relationships between $NO_2$ monitoring methods. In the table are given the parameter estimates A and B of equation (4.4), in conjunction with recommended ranges over which the linear relationships are applicable. These estimates are shown for each site and each pair of methods (there are 36 pairs of methods in all). The estimates obtained by combining the data from the seven sites (Site 832D excluded) are also presented. In Table C-1, X corresponds to method 1 and Y to method 2 in equation (4.4); hence,

N = number of (paired) observations

M1 = $\overline{X}$ = mean for first method

M2 = $\overline{Y}$ = mean for second method

SD1 = standard deviation for first method

SD2 = standard deviation for second method

COR = correlation between X and Y

Y = A + BX is the form of the estimated relationship obtained by orthogonal regression

PCV1 = the percentage of variability accounted for by the first principal component (see equation 4.7)

RATIO = M2/M1 = $\overline{Y}/\overline{X}$ = ratio of means

(M1LOW, M1HIGH) = recommended range for method 1 over which the estimated relationship is applicable

(M2LOW, M2HIGH) = same for method 2.

Section 4.4.c discusses the results given in Table C-1.

Following Table C-1, Figures C-1 through C-36 present graphically the site regressions shown in Table C-1. The figures only plot regressions based on more than 30 observations and exclude site 832D. The following legend applies to each figure:

| Site | Symbol |
|---|---|
| 632 | 1 |
| 633 | 2 |
| 901 | 3 |
| 902 | 4 |
| 831 | 5 |
| 832 | 6 |
| 841 | 7 |

In each figure Meth 1 (also denoted by Y1) is plotted on the horizontal axis and Meth 2 (also denoted by Y2) is plotted on the vertical axis. Thus in Figure C-1, the CHRF method is on the horizontal axis and the CHEM is on the vertical axis. The units for Y1 and Y2 are $\mu g/m^3$. In addition, the regression lines drawn in each figure are only over their recommended ranges which are given in Table C-1 for each method and site (i.e., M1LOW, M1HIGH and M2LOW, M2HIGH).

All the results given in this appendix were obtained from the daily data after removing outliers. The results shown in this appendix are for descriptive purposes only. Their general use is not recommended (see Section 5.4).

Table C-1

ORTHOGONAL REGRESSION SUMMARY OF NO2 MONITORING METHODS

METH1=CHRF METH2=CHEM

| SITE | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW[1/] | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 663 | 47.2 | 56.9 | 24.7 | 35.2 | .729 | -19.0056 | 1.60937 | 88.2 | 1.206 | 4.6 | 89.8 | 0.0 | 125.5 |
| 632 | 161 | 36.9 | 42.1 | 16.2 | 20.5 | .572 | -13.1304 | 1.49653 | 80.1 | 1.141 | 11.0 | 62.8 | 3.3 | 80.9 |
| 633 | 170 | 35.7 | 36.8 | 14.9 | 20.9 | .507 | -30.5630 | 1.88706 | 79.0 | 1.030 | 14.3 | 57.0 | 0.0 | 77.[illegible] |
| 831 | 12 | 58.6 | 59.6 | 21.9 | [illegible] | .786 | -14.7208 | 1.26610 | 69.7 | 1.017 | 18.3 | 98.9 | 8.5 | 11[illegible] |
| 832 | 114 | 66.1 | 82.1 | 30.9 | 43.7 | .656 | -28.7754 | 1.67651 | 85.1 | 1.241 | 15.6 | 116.7 | 0.0 | [illegible] |
| 832 D | 61 | 83.4 | 103.0 | 34.5 | 63.2 | .775 | -75.0447 | 2.13356 | 92.4 | 1.234 | 24.7 | 142.2 | 0.0 | 268.3 |
| 841 | 81 | 59.8 | 90.3 | 23.1 | 38.1 | .645 | -35.5275 | 2.10228 | 86.8 | 1.509 | 20.2 | 95.5 | 15.3 | 105.2 |
| 901 | 88 | 73.5 | 77.6 | 24.1 | 23.1 | .728 | 8.3196 | 0.94240 | 86.4 | 1.056 | 28.4 | 118.7 | 35.0 | 120.2 |
| 902 | 81 | 36.3 | 48.2 | 10.9 | 17.1 | .665 | -22.0371 | 1.93231 | 86.8 | 1.326 | 19.0 | 53.7 | 14.6 | 61.7 |

METH1=CHRF METH2=CHPO

| SITE | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 1326 | 49.0 | 47.0 | 25.6 | 24.0 | .927 | 1.23852 | .932970 | 96.0 | .958 | 0.0 | 99.4 | 0.0 | 94.0 |
| 632 | 219 | 34.7 | 34.5 | 16.0 | 15.5 | .856 | 1.02342 | .964586 | 92.8 | .994 | 3.8 | 65.6 | 4.7 | 64.3 |
| 633 | 225 | 33.6 | 32.2 | 15.7 | 14.5 | .864 | 1.45891 | .915271 | 93.2 | .959 | 3.2 | 64.0 | 4.4 | 60.1 |
| 831 | 49 | 53.0 | 51.8 | 26.4 | 25.1 | .954 | 1.63315 | .946118 | 97.7 | .977 | 0.8 | 105.3 | 2.3 | 101.3 |
| 832 | 185 | 68.8 | 65.1 | 33.0 | 32.6 | .938 | -2.99626 | .988992 | 96.9 | .945 | 3.9 | 133.7 | 0.6 | 129.3 |
| 832 D | 131 | 76.8 | 73.0 | 35.5 | 32.1 | .882 | 2.65291 | .892438 | 94.2 | .926 | 5.4 | 148.1 | 11.1 | 130.8 |
| 841 | 175 | 57.9 | 57.0 | 25.9 | 24.7 | .853 | 2.33486 | .944025 | 92.7 | .984 | 7.8 | 108.0 | 9.7 | 104.3 |
| 901 | 236 | 58.9 | 55.0 | 20.9 | 18.3 | .915 | 3.92625 | .866255 | 95.8 | .933 | 17.8 | 100.0 | 19.3 | 90.6 |
| 902 | 237 | 44.3 | 42.2 | 19.8 | 17.4 | .927 | 3.53874 | .871398 | 96.0 | .951 | 5.0 | 83.3 | 8.2 | 76.1 |

METH1=CHRF METH2=TECH

| SITE | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 268 | 32.0 | 56.8 | 14.1 | 28.8 | .709 | -25.8400 | 2.58627 | 91.6 | 1.778 | 9.6 | 54.1 | 0.0 | 114.0 |
| 632 | 132 | 31.0 | 52.8 | 13.1 | 24.4 | .568 | -30.7984 | 2.69399 | 86.3 | 1.762 | 13.1 | 48.9 | 4.6 | 101.1 |
| 633 | 136 | 32.9 | 60.8 | 14.9 | 32.1 | .803 | -21.6696 | 2.50701 | 94.5 | 1.848 | 7.8 | 58.8 | 0.0 | 124.7 |

METH1=CHRF METH2=TECA

| SITE | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 655 | 46.4 | 62.2 | 24.9 | 39.6 | .715 | -28.7639 | 1.87449 | 88.8 | 1.341 | 4.9 | 87.9 | 0.0 | 140.0 |
| 632 | 168 | 34.4 | 45.9 | 15.2 | 22.2 | .487 | -25.4440 | 2.07173 | 79.0 | 1.333 | 13.6 | 55.3 | 2.8 | 89.0 |
| 633 | 158 | 33.7 | 41.0 | 16.0 | 20.2 | .529 | -10.6177 | 1.53270 | 78.2 | 1.217 | 8.8 | 58.6 | 2.8 | 79.1 |
| 831 | 17 | 53.5 | 81.7 | 15.3 | 28.6 | .750 | -37.5444 | 2.23086 | 91.8 | 1.529 | 28.1 | 78.9 | 25.1 | 138.4 |
| 832 | 124 | 66.7 | 98.0 | 28.1 | 51.3 | .608 | -68.7850 | 2.50255 | 87.1 | 1.471 | 26.2 | 107.1 | 0.0 | 199.4 |
| 832 D | 63 | 83.3 | 91.6 | 34.3 | 52.3 | .834 | -45.6619 | 1.64929 | 93.1 | 1.101 | 20.6 | 145.9 | 0.0 | 194.9 |
| 841 | 80 | 61.0 | 89.9 | 22.6 | 39.6 | .717 | -39.1415 | 2.11756 | 90.0 | 1.475 | 20.0 | 97.9 | 11.8 | 168.1 |
| 901 | 27 | 76.9 | 62.9 | 24.9 | 30.1 | .653 | -39.6038 | 1.33368 | 83.4 | 0.819 | 34.1 | 119.8 | 5.9 | 120.0 |
| 902 | 80 | 37.2 | 47.9 | 13.7 | 15.2 | .779 | 5.1690 | 1.14968 | 89.1 | 1.289 | 11.8 | 62.5 | 18.8 | 77.1 |

Table C-1 (Continued)

METH1=CHRF METH2=TGSU

| SITE | | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 650 | 47.4 | 38.9 | 25.0 | 24.7 | .805 | -7.6510 | 0.98116 | 90.2 | 0.820 | 0.0 | 95.1 | 0.0 | 65.7 |
| 632 | | 108 | 33.8 | 27.9 | 14.6 | 14.7 | .631 | -6.1991 | 1.00893 | 81.6 | 0.826 | 7.5 | 60.1 | 1.4 | 50.5 |
| 633 | | 109 | 34.8 | 29.6 | 13.9 | 17.5 | .660 | -19.5003 | 1.40864 | 84.1 | 0.849 | 11.1 | 56.0 | 0.0 | 63.0 |
| 831 | | 11 | 60.4 | 68.6 | 18.4 | 32.7 | .537 | -91.0179 | 2.64100 | 84.7 | 1.135 | 36.0 | 84.9 | 4.0 | 133.2 |
| 832 | | 98 | 74.2 | 57.6 | 38.0 | 30.6 | .889 | -0.5336 | 0.78350 | 94.7 | 0.776 | 0.0 | 108.5 | 0.0 | 116.2 |
| 832 | D | 75 | 86.4 | 64.6 | 64.3 | 31.3 | .871 | 6.4928 | 0.67288 | 92.3 | 0.748 | 0.0 | 173.8 | 5.8 | 123.4 |
| 841 | | 88 | 52.4 | 45.6 | 24.9 | 29.6 | .838 | -19.7453 | 1.22721 | 92.1 | 0.870 | 5.5 | 55.4 | 0.0 | 103.[illegible] |
| 901 | | 122 | 51.1 | 41.5 | 15.9 | [illegible].6 | .661 | -43.5262 | 1.64524 | 86.3 | 0.813 | 20.6 | 77.5 | 0.0 | [illegible] |
| 902 | | 114 | 40.3 | 31.2 | 12.1 | 13.7 | .615 | -17.6154 | 1.21538 | 81.1 | 0.774 | 19.8 | 81.3 | 5.8 | [illegible] |

METH1=CHRF METH2=CHESBC

| SITE | | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 1184 | 48.4 | 55.1 | 25.1 | 33.3 | .620 | -20.3883 | 1.56150 | 82.8 | 1.140 | 7.8 | 89.3 | 0.0 | 119.1 |
| 632 | | 210 | 34.3 | 34.2 | 15.4 | 19.0 | .312 | -30.0572 | 1.87457 | 68.4 | 0.998 | 15.3 | 53.4 | 0.0 | 70.[illegible] |
| 633 | | 203 | 33.1 | 34.2 | 15.3 | 17.8 | .419 | -12.5419 | 1.41394 | 72.[illegible] | 1.035 | 10.1 | 50.1 | 1.7 | 66.[illegible] |
| 831 | | 53 | 56.0 | 54.3 | 28.1 | 28.9 | .685 | -3.9755 | 1.04054 | 84.3 | 0.970 | 4.6 | 107.3 | 0.8 | 107.[illegible] |
| 832 | | 186 | 65.2 | 77.2 | 31.1 | 43.1 | .586 | -34.7365 | 1.71653 | 82.0 | 1.180 | 16.8 | 113.6 | 0.0 | 100.[illegible] |
| 832 | D | 123 | 81.0 | 87.1 | 36.3 | 47.3 | .597 | -37.9658 | 1.54454 | 81.6 | 1.076 | 22.5 | 139.5 | 0.0 | 177.5 |
| 841 | | 154 | 56.5 | 65.8 | 24.3 | 32.2 | .588 | -24.6197 | 1.60119 | 81.5 | 1.165 | 17.9 | 95.0 | 4.1 | 127.6 |
| 901 | | 191 | 58.9 | 70.3 | 20.8 | 25.6 | .388 | -29.8641 | 1.70190 | 71.7 | 1.194 | 39.8 | 87.3 | 21.9 | 118.6 |
| 902 | | 187 | 44.8 | 55.4 | 20.7 | 30.2 | .420 | -45.7004 | 2.27576 | 76.8 | 1.247 | 18.6 | 70.2 | 0.0 | 114.1 |

METH1=CHRC METH2=CHEM

| SITE | | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 650 | 44.5 | 56.4 | 22.8 | 34.5 | .737 | -21.0308 | 1.73832 | 89.2 | 1.266 | 5.6 | 83.5 | 0.0 | 124.1 |
| 632 | | 164 | 36.8 | 42.3 | 15.3 | 20.2 | .497 | -20.9508 | 1.71903 | 77.5 | 1.150 | 14.4 | 59.2 | 3.8 | 80.8 |
| 633 | | 171 | 34.1 | 36.9 | 14.0 | 20.9 | .529 | -32.7982 | 2.04394 | 81.0 | 1.082 | 14.2 | 53.9 | 0.0 | 77.5 |
| 831 | | 12 | 54.3 | 60.1 | 20.2 | 26.8 | .814 | -16.6898 | 1.41377 | 91.5 | 1.107 | 17.2 | 91.4 | 7.7 | 112.6 |
| 832 | | 102 | 61.1 | 81.1 | 30.6 | 42.5 | .705 | -15.5667 | 1.58193 | 87.0 | 1.327 | 9.0 | 113.3 | 0.0 | 163.6 |
| 832 | D | 57 | 75.3 | 97.9 | 32.9 | 60.2 | .740 | -67.3859 | 2.19390 | 91.2 | 1.299 | 21.0 | 129.7 | 0.0 | 217.1 |
| 841 | | 76 | 59.4 | 92.7 | 22.7 | 38.4 | .647 | -35.7740 | 2.16312 | 87.2 | 1.561 | 24.5 | 94.3 | 17.2 | 168.3 |
| 901 | | 43 | 63.7 | 79.0 | 22.4 | 23.1 | .730 | 12.5415 | 1.04255 | 86.5 | 1.239 | 22.2 | 105.2 | 35.7 | 122.2 |
| 902 | | 82 | 36.0 | 48.5 | 11.4 | 17.0 | .598 | -19.5694 | 1.89283 | 83.5 | 1.349 | 18.5 | 53.4 | 15.5 | 81.6 |

METH1=CHRC METH2=TECH

| SITE | | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 270 | 32.4 | 56.7 | 14.0 | 28.7 | .678 | -29.7785 | 2.66998 | 90.7 | 1.750 | 11.0 | 53.7 | 0.0 | 113.7 |
| 632 | | 134 | 32.2 | 52.6 | 13.9 | 24.1 | .524 | -31.1591 | 2.60643 | 83.8 | 1.637 | 13.9 | 50.4 | 5.1 | 100.2 |
| 633 | | 136 | 32.6 | 60.6 | 14.2 | 32.2 | .806 | -25.2670 | 2.63494 | 95.0 | 1.860 | 8.2 | 57.0 | 0.0 | 124.8 |

Table C-1 (Continued)

METH1=CHRC METH2=TEC4

| SITE | | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 643 | 43.9 | 61.7 | 22.8 | 39.3 | .752 | -26.6239 | 2.01044 | 91.0 | 1.405 | 5.3 | 82.6 | 0.0 | 139.8 |
| 632 | | 170 | 34.3 | 46.2 | 14.6 | 22.1 | .518 | -26.7872 | 2.11420 | 80.8 | 1.346 | 14.0 | 54.7 | 3.2 | 89.2 |
| 633 | | 160 | 32.8 | 40.9 | 14.7 | 20.3 | .522 | -18.2251 | 1.80342 | 79.3 | 1.248 | 11.1 | 54.5 | 1.8 | 80.0 |
| 831 | | 18 | 51.3 | 81.1 | 13.6 | 27.1 | .748 | -4[illegible].2219 | 2.40607 | 92.3 | 1.582 | 28.9 | 73.6 | 27.4 | 134.9 |
| 832 | | 118 | 62.1 | 97.8 | 28.0 | 52.3 | .686 | -48.[illegible]505 | 2.36342 | 89.8 | 1.576 | 18.2 | 105.9 | 0.0 | 201.8 |
| 832 | D | 60 | 75.1 | 87.4 | 32.2 | 48 | .777 | -40.0811 | 1.69842 | 90.8 | 1.165 | 18.9 | 131.7 | 0.0 | 163.[illegible] |
| 841 | | 75 | 60.3 | 93.9 | 21.7 | 39.4 | .742 | -36.9900 | 2.16925 | 91.2 | 1.556 | 24.0 | 96.3 | 15.9 | 171 |
| 901 | | 26 | 65.9 | 64.2 | 22.0 | 30.4 | .725 | -38.1906 | 1.55244 | 87.8 | 0.973 | 27.6 | 104.0 | 5.0 | 123 |
| 902 | | 78 | 36.0 | 48.2 | 12.5 | 15.3 | .748 | 1.0954 | 1.30903 | 88.0 | 1.339 | 13.9 | 58.4 | 18.8 | 77.6 |

METH1=CHRC METH2=TGSC

| SITE | | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 633 | 46.6 | 38.7 | 24.0 | 24.7 | .790 | -9.7597 | 1.04031 | 89.5 | 0.831 | 1.4 | 91.7 | 0.0 | 85.6 |
| 632 | | 111 | 35.0 | 27.2 | 14.2 | 14.6 | .611 | -9.2548 | 1.04143 | 80.6 | 0.777 | 9.6 | 60.3 | 0.8 | 53.5 |
| 633 | | 109 | 35.4 | 29.5 | 13.6 | 17.5 | .595 | -24.1620 | 1.51703 | 81.4 | 0.835 | 13.4 | 57.4 | 0.0 | 63.0 |
| 831 | | 8 | 54.6 | 69.2 | 22.1 | 34.0 | .897 | -19.3949 | 1.61666 | 95.8 | 1.263 | 13.1 | 96.6 | 1.7 | 136.7 |
| 832 | | 91 | 71.4 | 58.0 | 37.2 | 30.6 | .892 | 0.6454 | 0.80380 | 94.8 | 0.813 | 0.0 | 104.4 | 0.0 | 116.8 |
| 832 | D | 69 | 80.7 | 64.4 | 41.2 | 33.2 | .849 | 1.9342 | 0.77500 | 92.6 | 0.798 | 0.3 | 161.1 | 2.1 | 126.7 |
| 841 | | 81 | 53.7 | 47.2 | 25.4 | 30.6 | .771 | -21.2950 | 1.27372 | 89.0 | 0.878 | 7.5 | 100.0 | 0.0 | 106.1 |
| 901 | | 120 | 49.5 | 41.7 | 15.4 | 22.8 | .674 | -45.2989 | 1.75634 | 86.4 | 0.843 | 24.2 | 74.8 | 0.0 | 86.1 |
| 902 | | 113 | 39.9 | 31.8 | 12.5 | 14.3 | .574 | -18.5363 | 1.26106 | 79.2 | 0.797 | 18.9 | 60.9 | 5.3 | 58.3 |

METH1=CHRO METH2=CHESSC

| SITE | | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 1169 | 46.3 | 54.6 | 23.6 | 32.5 | .590 | -23.7805 | 1.69291 | 82.0 | 1.179 | 9.2 | 83.3 | 0.0 | 117.3 |
| 632 | | 216 | 34.5 | 34.3 | 15.2 | 18.8 | .306 | -31.2030 | 1.90114 | 68.1 | 0.996 | 15.9 | 53.0 | 0.0 | 69.6 |
| 633 | | 206 | 32.0 | 34.2 | 14.5 | 17.6 | .427 | -16.2737 | 1.57543 | 73.1 | 1.067 | 11.1 | 52.9 | 1.2 | 67.1 |
| 831 | | 51 | 51.5 | 54.4 | 27.3 | 29.0 | .729 | -1.6039 | 1.08689 | 86.3 | 1.056 | 1.4 | 101.6 | 0.0 | 108.9 |
| 832 | | 166 | 62.1 | 76.1 | 31.3 | 40.3 | .539 | -22.0201 | 1.58020 | 78.9 | 1.226 | 13.6 | 110.6 | 0.0 | 152.7 |
| 832 | D | 113 | 71.1 | 85.5 | 27.4 | 47.3 | .601 | -80.4951 | 2.33320 | 86.0 | 1.202 | 31.2 | 111.1 | 0.0 | 178.7 |
| 841 | | 152 | 56.6 | 65.3 | 24.0 | 32.0 | .523 | -31.0905 | 1.70261 | 78.7 | 1.153 | 20.6 | 92.5 | 4.0 | 126.5 |
| 901 | | 193 | 55.1 | 70.4 | 18.1 | 26.0 | .348 | -69.4544 | 2.53688 | 73.9 | 1.277 | 35.1 | 75.1 | 19.7 | 121.0 |
| 902 | | 185 | 42.6 | 56.4 | 18.5 | 31.8 | .820 | -72.4500 | 3.02104 | 80.7 | 1.322 | 21.9 | 63.4 | 0.0 | 119.1 |

Table C-1 (Continued)

METH1=FRMF METH2=CHEM

| SITE | | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 648 | 72.1 | 56.6 | 36.8 | 35.0 | .687 | -10.400 | 0.53014 | 84.4 | 0.786 | 3.8 | 140.3 | 0.0 | 120.1 |
| 632 | | 155 | 60.4 | 42.1 | 26.4 | 20.6 | .512 | 4.441 | 0.62345 | 77.7 | 0.697 | 10.3 | 110.4 | 10.9 | 73.3 |
| 633 | | 178 | 56.1 | 36.5 | 25.7 | 20.4 | .428 | 3.114 | 0.59587 | 73.7 | 0.651 | 7.7 | 104.4 | 7.7 | 65.4 |
| 831 | | 14 | 70.8 | 60.2 | 31.6 | 25.2 | .094 | 46.193 | 0.19798 | 62.0 | 0.851 | 8.3 | 133.2 | 47.8 | 72.0 |
| 832 | | 102 | 111.2 | 86.0 | 51.4 | 46.2 | .705 | -9.561 | 0.85935 | 85.4 | 0.773 | 14.3 | 208.1 | 2.7 | 169.3 |
| 832 | D | 54 | 114.7 | 104.4 | 45.0 | 66.0 | .623 | -103.371 | 1.81114 | 84.2 | 0.910 | 43.8 | 185.7 | 0.0 | 232.9 |
| 841 | | 79 | 79.1 | 88.2 | 29.2 | 34.1 | .605 | -13.903 | 1.29068 | 80.9 | 1.115 | 29.6 | 128.6 | 24.8 | 152.1 |
| 901 | | 43 | 92.1 | 77.0 | 26.3 | [illegible] | .732 | -1.701 | 0.85470 | 86.8 | 0.836 | 42.2 | 142.0 | 34.3 | 119.[illegible] |
| 902 | | 81 | 62.3 | 48.5 | 18.1 | 16.9 | .497 | -5.775 | 0.87155 | 75.0 | 0.779 | 30.0 | 94.6 | 20.4 | [illegible] |

METH1=FRMF METH2=CHRF

| SITE | | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 1337 | 76.6 | 49.0 | 39.3 | 25.6 | .773 | 4.5189 | .580819 | 90.7 | .640 | 0.0 | 153.8 | 4.2 | 93.9 |
| 632 | | 211 | 56.5 | 34.5 | 25.6 | 15.8 | .620 | 7.5776 | .477152 | 85.7 | .611 | 6.2 | 106.8 | 10.5 | 58.5 |
| 633 | | 227 | 53.8 | 33.6 | 27.0 | 15.4 | .577 | 11.9869 | .408652 | 85.5 | .620 | 0.5 | 107.0 | 11.8 | 55.3 |
| 831 | | 50 | 73.0 | 56.9 | 39.4 | 28.6 | .776 | 8.3389 | .664666 | 90.0 | .779 | 0.0 | 149.9 | 5.7 | 108. |
| 832 | | 191 | 113.8 | 68.9 | 54.2 | 33.0 | .775 | 7.9594 | .534965 | 91.4 | .605 | 6.8 | 220.8 | 11.6 | 126.[illegible] |
| 832 | D | 131 | 109.8 | 78.5 | 44.6 | 35.7 | .644 | 0.4398 | .710723 | 83.2 | .715 | 24.8 | 194.8 | 18.1 | 138.9 |
| 841 | | 184 | 77.6 | 56.4 | 34.1 | 25.8 | .755 | 2.5218 | .694431 | 86.8 | .727 | 11.4 | 143.7 | 10.5 | 102.3 |
| 901 | | 237 | 90.0 | 57.9 | 27.9 | 20.4 | .723 | -0.7929 | .652545 | 87.7 | .644 | 35.7 | 144.2 | 22.5 | 93.3 |
| 902 | | 237 | 73.3 | 44.5 | 29.6 | 19.7 | .656 | 4.8176 | .542272 | 86.0 | .608 | 15.1 | 131.4 | 13.0 | 78.1 |

METH1=FRMF METH2=CHRG

| SITE | | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 1313 | 76.0 | 46.9 | 36.6 | 24.0 | .787 | 4.7961 | .554047 | 91.7 | .617 | 0.0 | 152.1 | 4.7 | 89.1 |
| 632 | | 218 | 56.0 | 34.1 | 25.6 | 15.0 | .642 | 7.9106 | .462428 | 86.8 | .610 | 5.6 | 106.4 | 10.5 | 57.8 |
| 633 | | 228 | 53.3 | 32.2 | 26.9 | 14.4 | .672 | 9.9870 | .416555 | 89.4 | .604 | 0.0 | 106.7 | 10.0 | 54.4 |
| 831 | | 47 | 72.5 | 51.6 | 39.2 | 25.4 | .734 | 10.9368 | .561126 | 89.3 | .712 | 0.0 | 149.5 | 8.4 | 94.8 |
| 832 | | 171 | 114.1 | 66.0 | 54.7 | 33.1 | .756 | 6.1707 | .524139 | 90.7 | .578 | 6.3 | 222.0 | 9.5 | 122.5 |
| 832 | D | 122 | 110.2 | 72.8 | 41.9 | 31.2 | .673 | 1.3201 | .649098 | 85.3 | .661 | 29.2 | 191.1 | 20.3 | 125.4 |
| 841 | | 176 | 80.0 | 57.3 | 34.3 | 24.9 | .786 | 3.7775 | .669550 | 90.5 | .717 | 13.0 | 147.0 | 12.5 | 102.2 |
| 901 | | 235 | 90.1 | 54.5 | 27.9 | 18.1 | .720 | 4.3781 | .556411 | 88.7 | .605 | 35.4 | 144.9 | 24.1 | 85.0 |
| 902 | | 238 | 72.2 | 42.7 | 27.1 | 17.5 | .741 | 2.0482 | .562331 | 89.5 | .591 | 19.1 | 125.4 | 12.8 | 72.6 |

Table C-1 (Continued)

METH1=FRMF METH2=TEAP

| SITE | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 1290 | 75.3 | 38.1 | 38.2 | 20.7 | .809 | 2.0038 | .478652 | 93.5 | .505 | 0.0 | 151.2 | 1.7 | 74.4 |
| 632 | 214 | 56.5 | 28.1 | 25.6 | 13.6 | .788 | 2.1980 | .456735 | 93.0 | .498 | 5.6 | 107.3 | 4.8 | 51.4 |
| 633 | 227 | 53.2 | 25.2 | 26.8 | 12.7 | .718 | 5.1737 | .376536 | 92.1 | .474 | 0.0 | 106.5 | 5.2 | 45.3 |
| 831 | 48 | 70.7 | 45.3 | 37.5 | 21.0 | .745 | 11.8912 | .472047 | 91.1 | .640 | 0.0 | 144.9 | 10.2 | 80.3 |
| 832 | 159 | 112.5 | 55.6 | 55.1 | [illegible] | .801 | 1.8848 | .477192 | 93.2 | .494 | 3.2 | 221.7 | 3.4 | 107 |
| 832 D | 115 | 109.5 | 64.1 | 42.5 | [illegible] | .722 | -11.9756 | .655212 | 87.2 | .586 | 27.3 | 191.6 | 7.0 | [illegible] |
| 841 | 168 | 78.7 | 45.5 | 33.8 | 22.6 | .786 | -1.9339 | .602918 | 91.1 | .578 | 12.1 | 145.2 | 5.4 | [illegible] |
| 901 | 239 | 89.5 | 43.0 | 27.6 | 14.8 | .725 | 3.4907 | .441966 | 90.9 | .481 | 34.8 | 144.1 | 18.9 | 67.2 |
| 902 | 235 | 73.0 | 35.9 | 29.7 | 14.9 | [illegible] | 5.6082 | .414720 | 92.2 | .492 | 14.0 | 131.9 | 11.4 | 60.3 |

METH1=FRMF METH2=TECH

| SITE | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 265 | 56.0 | 56.3 | 26.1 | 28.6 | .549 | -9.9188 | 1.18309 | 77.7 | 1.006 | 12.0 | 100.0 | 4.2 | 108. |
| 632 | 128 | 55.2 | 52.1 | 23.1 | 24.5 | .416 | -11.5041 | 1.15204 | 71.0 | 0.944 | 18.0 | 92.5 | 9.2 | 95. |
| 633 | 137 | 56.7 | 60.2 | 28.6 | 31.5 | .630 | -5.8535 | 1.16576 | 81.7 | 1.062 | 6.6 | 106.8 | 1.8 | 118.0 |

METH1=FRMF METH2=TEC4

| SITE | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 637 | 72.6 | 61.9 | 38.7 | 40.0 | .713 | -14.1319 | 1.04755 | 85.7 | 0.853 | 1.4 | 143.7 | 0.0 | 136.4 |
| 632 | 161 | 56.8 | 45.8 | 25.6 | 21.5 | .472 | 6.4368 | 0.69283 | 74.8 | 0.806 | 9.3 | 104.3 | 12.9 | 78.7 |
| 633 | 162 | 53.9 | 40.6 | 27.5 | 20.2 | .431 | 13.2378 | 0.50789 | 75.5 | 0.753 | 1.2 | 106.7 | 13.8 | 67.4 |
| 831 | 17 | 75.3 | 82.2 | 21.5 | 26.6 | .331 | -56.2822 | 1.83986 | 69.3 | 1.092 | 48.0 | 102.5 | 32.1 | 132.3 |
| 832 | 114 | 114.2 | 101.8 | 48.1 | 54.7 | .661 | -36.6097 | 1.21172 | 83.4 | 0.891 | 29.5 | 198.9 | 0.0 | 204.4 |
| 832 D | 56 | 111.3 | 93.9 | 46.0 | 54.8 | .674 | -50.0256 | 1.29338 | 84.3 | 0.844 | 31.0 | 191.6 | 0.0 | 197.8 |
| 841 | 60 | 83.3 | 89.4 | 32.4 | 37.3 | .647 | -14.1093 | 1.24276 | 82.8 | 1.073 | 27.0 | 139.6 | 19.5 | 159.4 |
| 901 | 25 | 98.5 | 62.2 | 27.4 | 30.6 | .831 | -50.1213 | 1.14052 | 91.7 | 0.632 | 46.7 | 150.3 | 3.1 | 121.3 |
| 902 | 78 | 62.9 | 48.0 | 19.2 | 15.2 | .611 | 4.8811 | 0.66584 | 81.9 | 0.763 | 26.3 | 99.4 | 22.9 | 73.1 |

METH1=FRMF METH2=TGSD

| SITE | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 648 | 80.7 | 39.0 | 41.2 | 25.0 | .689 | -1.1686 | 0.49813 | 88.3 | .484 | 0.0 | 161.8 | 0.0 | 79.8 |
| 632 | 105 | 61.1 | 27.9 | 25.6 | 15.1 | .409 | 7.7485 | 0.32924 | 80.1 | .456 | 10.4 | 111.6 | 11.2 | 44.5 |
| 633 | 110 | 62.1 | 29.3 | 28.4 | 17.4 | .290 | 12.9387 | 0.26273 | 76.2 | .471 | 5.8 | 118.4 | 14.5 | 40.0 |
| 831 | 9 | 82.5 | 66.6 | 32.0 | 32.8 | .867 | -18.0506 | 1.02634 | 93.4 | .808 | 20.7 | 144.3 | 3.2 | 130.1 |
| 832 | 94 | 131.1 | 59.6 | 59.4 | 31.5 | .822 | -2.2813 | 0.47211 | 94.1 | .455 | 13.1 | 249.0 | 3.9 | 115.3 |
| 832 D | 72 | 122.5 | 64.6 | 49.9 | 28.9 | .663 | 8.6282 | 0.45714 | 88.0 | .528 | 24.1 | 221.0 | 19.6 | 109.7 |
| 841 | 92 | 78.4 | 45.7 | 38.4 | 29.9 | .759 | -10.7443 | 0.71976 | 88.8 | .583 | 4.0 | 152.9 | 0.0 | 99.3 |
| 901 | 121 | 86.0 | 41.4 | 25.0 | 22.7 | .574 | -31.6123 | 0.84956 | 79.0 | .482 | 40.2 | 131.8 | 2.6 | 60.3 |
| 902 | 117 | 71.2 | 31.7 | 23.8 | 14.0 | .251 | 16.3456 | 0.21610 | 76.6 | .446 | 23.9 | 118.6 | 31.5 | 42.0 |

Table C-1 (Continued)

------------------------------------------ METH1=FRMF METH2=CHESSC ------------------------------------------

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 1166 | 75.6 | 54.9 | 39.5 | 33.5 | .594 | -2.4402 | 0.75857 | 80.4 | .726 | 1.6 | 149.6 | 0.0 | 111.0 |
| 632 | 208 | 55.7 | 34.2 | 25.4 | 18.8 | .406 | 6.2654 | 0.50242 | 74.2 | .615 | 7.0 | 104.4 | 9.8 | 98.7 |
| 633 | 207 | 52.7 | 33.9 | 27.0 | 17.4 | .454 | 12.1949 | 0.41234 | 79.3 | .644 | 0.0 | 105.6 | 12.1 | 55.7 |
| 831 | 52 | 72.7 | 56.7 | 36.4 | 27.9 | .650 | 11.7292 | 0.61802 | 84.5 | .779 | 0.0 | 146.9 | 10.8 | 102.5 |
| 832 | 171 | 112.8 | 76.8 | 53.8 | 44.5 | .553 | -3.4565 | 0.71141 | 78.7 | .681 | 11.8 | 213.7 | 8.9 | 148.6 |
| 832 D | 111 | 112.3 | 86.3 | 43.5 | 47.1 | .428 | -49.2534 | 1.20742 | 71.7 | .769 | 43.1 | 181.5 | 2.7 | 169.9 |
| 841 | 152 | 78.3 | 66.0 | 33.7 | 32.6 | .565 | -7.7055 | 0.94146 | 78.3 | .843 | 17.9 | 138.7 | 9.2 | 122. |
| 901 | 190 | 90.1 | 69.5 | 28.4 | [illegible] | .314 | 1.7370 | 0.75171 | 66.3 | .771 | 40.1 | 140.1 | 31.9 | [illegible] |
| 902 | 186 | 73.0 | 56.8 | 30.5 | 31.7 | .367 | -24.1208 | 1.10876 | 68.5 | .778 | 24.3 | 121.7 | 2.8 | [illegible] |

------------------------------------------ METH1=TEAF METH2=CHEM ------------------------------------------

| SITE | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 635 | 35.9 | 55.0 | 19.2 | 33.5 | .757 | -18.1422 | 2.03941 | 91.3 | 1.534 | 3.4 | 68.4 | 0.0 | 121.3 |
| 632 | 162 | 29.8 | 42.3 | 14.1 | 20.3 | .642 | -9.3384 | 1.73339 | 84.8 | 1.420 | 7.0 | 52.6 | 2.8 | 81.8 |
| 633 | 170 | 26.0 | 36.8 | 12.3 | 20.8 | .708 | -16.1277 | 2.03807 | 89.2 | 1.417 | 5.8 | 46.1 | 0.0 | 77.8 |
| 831 | 10 | 44.2 | 60.2 | 20.7 | 25.2 | .460 | -7.0168 | 1.52140 | 74.8 | 1.363 | 13.2 | 75.1 | 13.1 | 107. |
| 832 | 40 | 52.4 | 77.4 | 25.5 | 42.5 | .735 | -25.5327 | 1.96439 | 90.1 | 1.477 | 9.7 | 95.1 | 0.0 | 161.3 |
| 832 D | 48 | 67.0 | 101.5 | 34.2 | 65.7 | .834 | -42.5592 | 2.15037 | 94.6 | 1.515 | 6.2 | 127.8 | 0.0 | 232.2 |
| 841 | 76 | 46.9 | 90.9 | 20.4 | 38.9 | .572 | -39.2791 | 2.77453 | 86.9 | 1.937 | 10.1 | 74.7 | 13.8 | 167.9 |
| 901 | 42 | 46.6 | 75.8 | 14.3 | 21.6 | .820 | -4.1627 | 1.64600 | 92.5 | 1.560 | 22.7 | 74.4 | 33.3 | 118.3 |
| 902 | 81 | 32.2 | 48.7 | 9.7 | 16.9 | .728 | -18.8537 | 2.09950 | 90.4 | 1.513 | 16.2 | 48.1 | 15.2 | 82.1 |

------------------------------------------ METH1=TEAF METH2=CHRF ------------------------------------------

| SITE | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 1310 | 38.1 | 48.5 | 20.6 | 25.0 | .846 | 0.54423 | 1.25673 | 92.6 | 1.271 | 0.0 | 76.9 | 0.0 | 97.2 |
| 632 | 217 | 28.4 | 34.7 | 13.8 | 15.7 | .714 | 0.54913 | 1.20134 | 86.0 | 1.221 | 3.6 | 53.2 | 4.9 | 64.5 |
| 633 | 223 | 25.5 | 33.7 | 12.9 | 15.6 | .731 | 0.54512 | 1.29978 | 87.1 | 1.321 | 2.5 | 48.5 | 3.7 | 63.6 |
| 831 | 50 | 45.9 | 53.2 | 20.8 | 25.0 | .852 | -3.71542 | 1.23936 | 92.9 | 1.158 | 6.5 | 85.3 | 4.4 | 102.0 |
| 832 | 174 | 54.2 | 67.2 | 29.2 | 32.9 | .882 | 4.98343 | 1.14856 | 94.2 | 1.241 | 0.0 | 110.2 | 2.8 | 131.6 |
| 832 D | 123 | 64.1 | 78.8 | 33.7 | 37.5 | .907 | 6.68874 | 1.12484 | 95.4 | 1.229 | 0.0 | 129.6 | 5.2 | 152.5 |
| 841 | 171 | 45.4 | 57.7 | 22.4 | 25.9 | .744 | 2.56433 | 1.21648 | 87.5 | 1.273 | 4.7 | 86.0 | 2.3 | 107.2 |
| 901 | 239 | 43.1 | 57.9 | 14.9 | 19.7 | .792 | -3.60106 | 1.42671 | 90.5 | 1.343 | 16.1 | 70.1 | 19.4 | 96.4 |
| 902 | 236 | 35.4 | 44.1 | 14.6 | 19.8 | .829 | -6.71722 | 1.43831 | 92.3 | 1.248 | 8.4 | 62.3 | 5.4 | 82.9 |

Table C-1 (Continued)

METH1=TEAF METH2=CHRO

| SITE | | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 1285 | 37.9 | 46.4 | 20.5 | 23.2 | .858 | 2.4597 | 1.15771 | 93.0 | 1.223 | 0.0 | 77.0 | 1.2 | 91.6 |
| 632 | | 221 | 28.4 | 34.3 | 13.7 | 15.5 | .729 | 0.5903 | 1.18843 | 86.7 | 1.209 | 3.6 | 53.2 | 4.8 | 63.8 |
| 633 | | 224 | 25.4 | 32.4 | 12.9 | 14.6 | .773 | 2.6763 | 1.17199 | 88.8 | 1.277 | 1.5 | 49.2 | 4.5 | 60.4 |
| 831 | | 49 | 42.8 | 48.0 | 20.0 | 21.7 | .809 | 0.5638 | 1.10646 | 90.5 | 1.122 | 5.2 | 80.4 | 6.4 | 89.7 |
| 832 | | 155 | 54.6 | 64.9 | 29.5 | [illegible] | .890 | 4.7735 | 1.10038 | 94.6 | 1.188 | 0.0 | 111.7 | 2.2 | 127.6 |
| 832 | D | 124 | 64.2 | 73.4 | 33.6 | [illegible] | .900 | 12.5190 | 0.94844 | 95.0 | 1.143 | 0.0 | 129.8 | 11.2 | 13[illegible] |
| 841 | | 163 | 46.3 | 58.1 | 22.7 | 24.6 | .782 | 6.7176 | 1.10954 | 89.2 | 1.255 | 3.9 | 88.7 | 11.0 | 1[illegible] |
| 901 | | 237 | 43.4 | 54.3 | 14.9 | 17.3 | .773 | 1.7093 | 1.21207 | 88.9 | 1.251 | 16.0 | 70.8 | 21.1 | 67.5 |
| 902 | | 236 | 35.5 | 42.3 | 14.8 | 17.5 | .844 | -[illegible].8609 | 1.21503 | 92.4 | 1.191 | 7.5 | 63.5 | 8.3 | 76.4 |

METH1=TEAF METH2=TECH

| SITE | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 266 | 28.1 | 56.8 | 13.6 | 28.8 | .729 | -17.2975 | 2.63888 | 92.4 | 2.023 | 6.4 | 49.8 | 0.0 | 114.[illegible] |
| 632 | 132 | 28.7 | 52.7 | 13.4 | 24.1 | .586 | -19.6367 | 2.52245 | 86.3 | 1.837 | 9.8 | 47.5 | 5.0 | 100.[illegible] |
| 633 | 134 | 27.5 | 60.9 | 13.8 | 32.3 | .865 | -10.5500 | 2.59677 | 96.6 | 2.213 | 2.7 | 52.3 | 0.0 | 125.3 |

METH1=TEAF METH2=TEC4

| SITE | | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 619 | 35.6 | 58.8 | 19.2 | 35.6 | .757 | -19.2612 | 2.19319 | 91.9 | 1.652 | 3.0 | 67.8 | 0.0 | 129.4 |
| 632 | | 164 | 28.7 | 46.1 | 13.7 | 22.4 | .589 | -17.2175 | 2.20816 | 84.8 | 1.608 | 8.7 | 48.6 | 2.0 | 90.2 |
| 633 | | 161 | 26.1 | 40.6 | 13.3 | 20.2 | .595 | -10.6562 | 1.96771 | 83.8 | 1.559 | 6.0 | 46.1 | 1.2 | 80.1 |
| 831 | | 17 | 47.1 | 79.3 | 15.8 | 26.8 | .884 | -5.8136 | 1.80814 | 95.6 | 1.685 | 17.7 | 76.5 | 26.2 | 132.5 |
| 832 | | 102 | 50.6 | 91.7 | 24.5 | 46.0 | .716 | -25.1346 | 2.30800 | 90.8 | 1.812 | 11.1 | 90.2 | 0.5 | 182.9 |
| 832 | D | 49 | 64.3 | 91.7 | 32.8 | 57.1 | .924 | -24.9932 | 1.81544 | 97.2 | 1.426 | 1.7 | 126.8 | 0.0 | 265.3 |
| 841 | | 71 | 47.9 | 88.6 | 18.1 | 38.3 | .660 | -47.4467 | 2.84190 | 90.7 | 1.851 | 21.1 | 74.7 | 12.6 | 164.7 |
| 901 | | 25 | 51.5 | 61.2 | 15.4 | 28.8 | .724 | -56.0480 | 2.27615 | 90.9 | 1.188 | 26.4 | 76.6 | 4.1 | 118.2 |
| 902 | | 79 | 31.5 | 47.9 | 11.2 | 15.3 | .772 | 0.6545 | 1.49986 | 89.8 | 1.521 | 11.5 | 51.4 | 18.0 | 77.8 |

METH1=TEAF METH2=TGSC

| SITE | | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 625 | 38.4 | 37.8 | 21.5 | 23.6 | .762 | -5.5566 | 1.13143 | 88.2 | 0.987 | 0.0 | 78.1 | 0.0 | 62.8 |
| 632 | | 110 | 30.4 | 27.3 | 14.7 | 14.9 | .557 | -3.6907 | 1.02014 | 77.9 | 0.899 | 4.5 | 56.2 | 0.9 | 53.7 |
| 633 | | 110 | 28.8 | 29.3 | 13.5 | 17.5 | .633 | -13.9163 | 1.48617 | 83.1 | 1.017 | 6.3 | 51.3 | 0.0 | 62.8 |
| 831 | | 9 | 46.5 | 60.3 | 14.6 | 30.2 | .802 | -51.3196 | 2.39660 | 94.2 | 1.296 | 21.5 | 71.6 | 0.2 | 120.5 |
| 832 | | 84 | 61.3 | 57.5 | 34.8 | 30.2 | .852 | 5.5290 | 0.84800 | 92.8 | 0.938 | 0.0 | 129.1 | 0.1 | 115.0 |
| 832 | D | 72 | 72.6 | 64.3 | 39.3 | 32.8 | .897 | 4.8692 | 0.81636 | 95.0 | 0.885 | 0.0 | 149.9 | 1.1 | 127.6 |
| 841 | | 80 | 43.3 | 44.1 | 23.2 | 26.9 | .818 | -7.9250 | 1.20164 | 91.1 | 1.018 | 0.0 | 86.7 | 0.0 | 96.2 |
| 901 | | 120 | 38.5 | 41.4 | 12.7 | 22.7 | .621 | -50.6095 | 2.39203 | 67.2 | 1.077 | 19.7 | 57.2 | 0.0 | 86.3 |
| 902 | | 112 | 34.0 | 31.7 | 11.7 | 14.4 | .522 | -18.6136 | 1.47797 | 77.5 | 0.931 | 15.8 | 52.3 | 1.7 | 58.7 |

Table C-1 (Continued)

METH1=TEAF METH2=CHESSC

| SITE | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 1141 | 37.4 | 53.8 | 20.4 | 32.4 | .613 | -22.4750 | 2.04057 | 85.0 | 1.039 | 6.3 | 66.4 | 0.0 | 117.2 |
| 632 | 212 | 27.9 | 34.5 | 13.0 | 18.8 | .483 | -22.6322 | 2.04820 | 78.7 | 1.237 | 10.1 | 45.7 | 0.0 | 71.0 |
| 633 | 205 | 24.8 | 33.8 | 12.5 | 17.3 | .494 | -12.6756 | 1.87149 | 78.2 | 1.361 | 7.0 | 42.7 | 6.4 | 67.2 |
| 831 | 50 | 44.4 | 50.2 | 21.4 | 26.4 | .705 | -9.4746 | 1.34475 | 86.0 | 1.131 | 6.8 | 82.0 | 0.0 | 100.7 |
| 832 | 154 | 52.7 | 73.9 | 28.2 | 41.7 | .573 | -27.4871 | 1.92327 | 82.5 | 1.402 | 10.5 | 94.9 | 0.0 | 155.0 |
| 832 D | 110 | 64.1 | 86.7 | 32.3 | 49.3 | .619 | [illegible] | 1.92472 | 84.7 | 1.353 | 14.0 | 114.1 | 0.0 | 163.0 |
| 841 | 142 | 45.5 | 65.7 | 22.4 | [illegible] | .511 | [illegible] | 2.02515 | 79.9 | 1.443 | 14.1 | 76.9 | 2.1 | 129.7 |
| 901 | 192 | 43.2 | 69.8 | 15.0 | [illegible] | .386 | -69.1785 | 3.22245 | 79.7 | 1.617 | 27.5 | 58.9 | 19.1 | [illegible] |
| 902 | 186 | 35.3 | 56.6 | 15.5 | 31.6 | .494 | -64.2786 | 3.42902 | 86.3 | 1.606 | 16.9 | 53.6 | 0.0 | [illegible] |

METH1=TECH METH2=CHEM

| SITE | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 222 | 56.0 | 44.3 | 30.4 | 22.2 | .643 | 9.5804 | .619504 | 84.2 | .790 | 0.0 | 110.7 | 8.0 | 80.6 |
| 632 | 108 | 49.3 | 43.7 | 24.2 | 19.0 | .476 | 13.6712 | .609796 | 76.0 | .887 | 3.6 | 95.0 | 15.9 | 71.6 |
| 633 | 114 | 62.4 | 44.8 | 34.1 | 24.9 | .745 | 3.7631 | .657888 | 88.6 | .718 | 0.0 | 128.8 | 1.1 | 88.5 |

METH1=TECH METH2=TECA

| SITE | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 227 | 59.2 | 44.6 | 30.6 | 21.3 | .560 | 12.7391 | .537946 | 81.5 | .753 | 0.0 | 118.4 | 12.7 | 76.5 |
| 632 | 114 | 54.8 | 48.2 | 26.4 | 22.7 | .548 | 6.7104 | .757498 | 78.1 | .880 | 5.7 | 103.9 | 11.0 | 85.4 |
| 633 | 113 | 63.6 | 40.9 | 33.8 | 19.2 | .673 | 12.2594 | .450266 | 88.6 | .643 | 0.0 | 130.4 | 10.8 | 71.0 |

METH1=TECA METH2=CHEM

| SITE | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 545 | 63.5 | 59.9 | 39.3 | 36.7 | .827 | 1.4387 | 0.92066 | 91.4 | 0.943 | 0.0 | 139.1 | 0.0 | 129.5 |
| 632 | 126 | 46.2 | 40.2 | 23.4 | 17.1 | .638 | 11.6143 | 0.61793 | 84.0 | 0.869 | 1.0 | 91.4 | 12.2 | 68.1 |
| 633 | 132 | 38.5 | 39.5 | 17.7 | 23.8 | .505 | -27.9595 | 1.75223 | 78.1 | 1.026 | 12.5 | 64.5 | 0.0 | 85.0 |
| 831 | 12 | 66.2 | 48.4 | 33.0 | 23.6 | .890 | 2.9890 | 0.68669 | 95.1 | 0.732 | 1.0 | 131.3 | 3.7 | 93.2 |
| 832 | 107 | 100.7 | 83.8 | 46.4 | 41.9 | .882 | -5.8883 | 0.89059 | 94.2 | 0.832 | 10.1 | 141.3 | 3.1 | 164.5 |
| 832 D | 54 | 98.4 | 109.8 | 54.8 | 65.3 | .956 | -8.3323 | 1.20118 | 97.8 | 1.116 | 0.0 | 206.2 | 0.0 | 239.4 |
| 841 | 80 | 92.5 | 95.3 | 36.4 | 36.5 | .744 | 2.4497 | 1.00418 | 87.2 | 1.031 | 24.6 | 160.4 | 27.1 | 163.5 |
| 901 | 28 | 63.4 | 83.7 | 29.6 | 23.3 | .787 | 36.8001 | 0.73931 | 90.0 | 1.320 | 5.9 | 120.9 | 41.2 | 120.2 |
| 902 | 60 | 49.5 | 47.2 | 14.7 | 16.7 | .576 | -14.4482 | 1.25620 | 79.3 | 0.964 | 24.9 | 74.2 | 16.8 | 78.7 |

Table C-1 (Continued)

METH1=TGSC METH2=CHEM

| SITE | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 351 | 35.7 | 56.8 | 22.5 | 35.0 | .730 | -7.5240 | 1.80081 | 89.1 | 1.590 | 0.0 | 73.8 | 0.0 | 125.0 |
| 632 | 112 | 27.2 | 44.9 | 14.8 | 21.8 | .405 | -19.4164 | 2.36423 | 76.3 | 1.651 | 9.3 | 65.1 | 2.5 | 67.3 |
| 633 | 106 | 30.0 | 41.5 | 17.6 | 23.1 | .551 | -7.1733 | 1.62221 | 79.7 | 1.383 | 2.7 | 57.2 | 0.0 | 65.6 |
| 832 | 53 | 53.8 | 95.1 | 29.6 | 43.3 | .878 | -2.0785 | 1.54088 | 94.8 | 1.765 | 0.0 | 109.5 | 9.4 | 180.7 |
| 832 D | 22 | 62.0 | 139.2 | 29.8 | 74.9 | .888 | -31.[illegible]345 | 2.74920 | 97.5 | 2.244 | 7.7 | 116.4 | 0.0 | 288.7 |
| 841 | 27 | 52.0 | 95.2 | 29.1 | 3[illegible].7 | .755 | 22.1720 | 1.40511 | 88.6 | 1.832 | 0.0 | 104.0 | 22.1 | 168.[illegible] |
| 901 | 9 | 43.1 | 82.5 | 12.3 | 25.8 | .953 | -10.7615 | 2.16444 | 98.6 | 1.915 | 19.3 | 66.9 | 31.0 | 13[illegible] |
| 902 | 44 | 37.7 | 48.7 | 18.7 | 17.0 | .394 | 19.0841 | 0.78655 | 70.2 | 1.293 | 0.4 | 71.0 | 22.5 | 7[illegible].9 |

METH1=TGSC METH2=TECH

| SITE | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 191 | 28.8 | 56.1 | 16.3 | 29.8 | .538 | -22.6463 | 2.73142 | 85.1 | 1.946 | 7.3 | 50.4 | 0.0 | 114.9 |
| 632 | 95 | 27.0 | 49.9 | 14.1 | 23.0 | .425 | -24.6462 | 2.76311 | 79.6 | 1.850 | 10.6 | 43.4 | 4.7 | 95.2 |
| 633 | 96 | 30.7 | 62.2 | 18.2 | 34.2 | .565 | -20.0020 | 2.68208 | 87.0 | 2.030 | 5.4 | 55.9 | 0.0 | 130.[illegible] |

METH1=TGSC METH2=TECH

| SITE | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 302 | 39.5 | 65.9 | 25.2 | 46.1 | .723 | -21.8427 | 2.22101 | 90.7 | 1.668 | 0.0 | 80.6 | 0.0 | 157.2 |
| 632 | 79 | 28.2 | 48.8 | 15.1 | 23.4 | .631 | -6.4084 | 1.95987 | 85.4 | 1.732 | 4.8 | 51.6 | 3.0 | 94.7 |
| 633 | 81 | 31.5 | 39.1 | 18.9 | 17.3 | .389 | 14.0251 | 0.79629 | 69.9 | 1.242 | 0.0 | 65.0 | 12.4 | 65.8 |
| 831 | 6 | 85.2 | 86.0 | 23.4 | 23.1 | .723 | 2.3174 | 0.98181 | 86.2 | 1.009 | 41.7 | 128.8 | 43.3 | 128.8 |
| 832 | 59 | 54.1 | 122.4 | 27.9 | 59.1 | .792 | -10.9691 | 2.47539 | 94.1 | 2.273 | 6.6 | 101.6 | 5.4 | 240.4 |
| 832 D | 19 | 66.5 | 137.9 | 29.3 | 61.1 | .891 | -11.6070 | 2.24821 | 96.8 | 2.074 | 12.3 | 120.7 | 16.1 | 259.7 |
| 841 | 32 | 53.2 | 87.2 | 35.2 | 43.3 | .898 | 20.0815 | 1.26107 | 95.1 | 1.638 | 0.0 | 120.8 | 1.9 | 172.4 |
| 901 | 8 | 44.2 | 62.9 | 12.6 | 23.6 | .796 | -32.9606 | 2.16808 | 93.3 | 1.423 | 22.9 | 66.0 | 15.7 | 110.2 |
| 902 | 37 | 37.9 | 49.4 | 17.7 | 13.5 | .757 | 22.8418 | 0.70089 | 88.8 | 1.304 | 3.6 | 72.2 | 25.3 | 73.5 |

METH1=CH2SSO METH2=CHEM

| SITE | N | M1 | M2 | SD1 | SD2 | COR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 645 | 52.3 | 57.7 | 33.5 | 37.3 | .596 | -4.707 | 1.19481 | 80.1 | 1.105 | 0.0 | 109.8 | 0.0 | 126.5 |
| 632 | 164 | 37.2 | 41.2 | 21.2 | 19.1 | .342 | 13.740 | 0.73925 | 67.8 | 1.109 | 0.0 | 74.9 | 13.4 | 69.1 |
| 633 | 164 | 36.6 | 37.7 | 19.1 | 22.6 | .402 | -17.653 | 1.50422 | 71.5 | 1.024 | 9.0 | 64.5 | 0.0 | 79.4 |
| 831 | 16 | 59.3 | 85.1 | 19.7 | 56.0 | .398 | -295.384 | 6.41345 | 90.9 | 1.434 | 41.9 | 76.8 | 0.0 | 197.0 |
| 832 | 116 | 76.0 | 84.9 | 46.2 | 44.6 | .476 | 12.773 | 0.92476 | 73.8 | 1.088 | 0.0 | 159.0 | 10.0 | 159.9 |
| 832 D | 52 | 83.0 | 100.0 | 47.0 | 65.5 | .696 | -32.467 | 1.59673 | 86.7 | 1.205 | 3.3 | 162.6 | 0.0 | 227.2 |
| 841 | 75 | 69.2 | 92.5 | 31.8 | 38.9 | .491 | -10.820 | 1.49336 | 76.0 | 1.337 | 20.5 | 117.9 | 19.7 | 165.3 |
| 901 | 30 | 81.7 | 79.9 | 23.7 | 24.5 | .433 | -6.946 | 1.08809 | 71.7 | 0.979 | 42.6 | 120.7 | 37.4 | 122.4 |
| 902 | 80 | 49.2 | 46.8 | 23.9 | 17.5 | .448 | 21.522 | 0.51457 | 76.2 | 0.952 | 5.2 | 95.1 | 23.2 | 70.5 |

Table C-1 (Continued)

METH1=CHESSO METH2=TECH

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 261 | 35.0 | 55.1 | 19.6 | 29.1 | .292 | -53.7663 | 3.10822 | 73.2 | 1.573 | 16.6 | 53.4 | 0.0 | 112.2 |
| 632 | 136 | 33.9 | 51.1 | 19.4 | 24.8 | .152 | -70.5682 | 3.58542 | 64.2 | 1.506 | 20.4 | 47.5 | 2.5 | 99.7 |
| 633 | 125 | 36.2 | 59.4 | 19.8 | 32.7 | .400 | -47.1851 | 2.94457 | 79.1 | 1.641 | 14.3 | 58.1 | 0.0 | 123.8 |

METH1=CHESSO METH2=TECH

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 635 | 51.1 | 62.3 | 34.7 | 39.7 | .646 | -0.723 | 1.23363 | 82.7 | 1.219 | 0.0 | 111.5 | 0.0 | 136.8 |
| 632 | 170 | 34.5 | 45.7 | 20.0 | 21.2 | .264 | 2.438 | 1.25680 | 63.5 | 1.328 | 5.5 | 63.4 | 9.4 | 82.1 |
| 633 | 160 | 34.6 | 40.1 | 18.7 | 19.5 | .208 | -2.453 | 1.22817 | 60.6 | 1.157 | 8.0 | 61.2 | 7.4 | 72.8 |
| 831 | 19 | 64.8 | 87.9 | 23.1 | 27.7 | .709 | 4.306 | 1.29055 | 86.0 | 1.357 | 23.9 | 105.7 | 35.1 | 140.8 |
| 832 | 123 | 76.7 | 99.2 | 46.6 | 51.4 | .655 | 7.828 | 1.16107 | 82.9 | 1.261 | 0.0 | 161.2 | 3.4 | 144.9 |
| 832 D | 53 | 82.6 | 91.3 | 45.4 | 54.0 | .739 | -13.386 | 1.26650 | 87.4 | 1.105 | 0.9 | 164.4 | 0.0 | 194.8 |
| 841 | 72 | 70.0 | 93.0 | 31.2 | 38.1 | .358 | -26.820 | 1.71055 | 70.1 | 1.328 | 28.5 | 111.6 | 21.9 | 164.1 |
| 901 | 20 | 89.7 | 67.3 | 23.1 | 33.4 | .481 | -116.499 | 2.04835 | 78.5 | 0.750 | 58.2 | 121.3 | 2.7 | 132.0 |
| 902 | 71 | 46.1 | 48.4 | 24.2 | 15.7 | .353 | 32.374 | 0.34721 | 76.0 | 1.049 | 0.0 | 93.6 | 31.9 | 64.9 |

METH1=CHESSO METH2=TGSO

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 556 | 60.1 | 38.6 | 36.4 | 24.2 | .496 | 10.6553 | 0.46470 | 79.9 | 0.642 | 0.0 | 131.1 | 5.6 | 71.6 |
| 632 | 101 | 37.5 | 26.8 | 20.2 | 14.2 | .165 | 17.7811 | 0.24084 | 69.1 | 0.715 | 0.0 | 77.4 | 17.2 | 36.4 |
| 633 | 96 | 39.4 | 27.6 | 20.2 | 15.5 | .247 | 12.2434 | 0.39002 | 67.6 | 0.701 | 0.3 | 78.5 | 12.4 | 42.9 |
| 831 | 11 | 54.8 | 68.6 | 26.4 | 32.7 | .795 | -2.9875 | 1.30699 | 90.3 | 1.252 | 6.2 | 103.4 | 5.1 | 132.1 |
| 832 | 86 | 94.8 | 56.0 | 51.3 | 30.4 | .520 | 18.5637 | 0.39942 | 83.1 | 0.595 | 0.0 | 195.9 | 16.1 | 96.8 |
| 832 D | 68 | 100.0 | 61.9 | 52.1 | 28.9 | .588 | 22.3292 | 0.39571 | 86.4 | 0.619 | 0.0 | 203.0 | 21.2 | 102.7 |
| 841 | 78 | 66.6 | 45.2 | 30.6 | 25.6 | .498 | -1.7934 | 0.70520 | 76.0 | 0.678 | 9.8 | 123.5 | 5.1 | 65.3 |
| 901 | 98 | 68.7 | 42.4 | 25.1 | 23.3 | .243 | -8.8389 | 0.74488 | 62.6 | 0.616 | 25.2 | 112.2 | 10.0 | 74.7 |
| 902 | 86 | 60.1 | 32.7 | 31.6 | 15.2 | .096 | 29.3479 | 0.05626 | 81.3 | 0.545 | 0.0 | 123.2 | 29.2 | 36.3 |

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1/ Note if M1LOW or M2LOW was negative it was set at 0 $\mu g/m^3$.

Figure C-1

METH1=CHRP METH2=CHEM

PLOT OF Y2 VS Y1

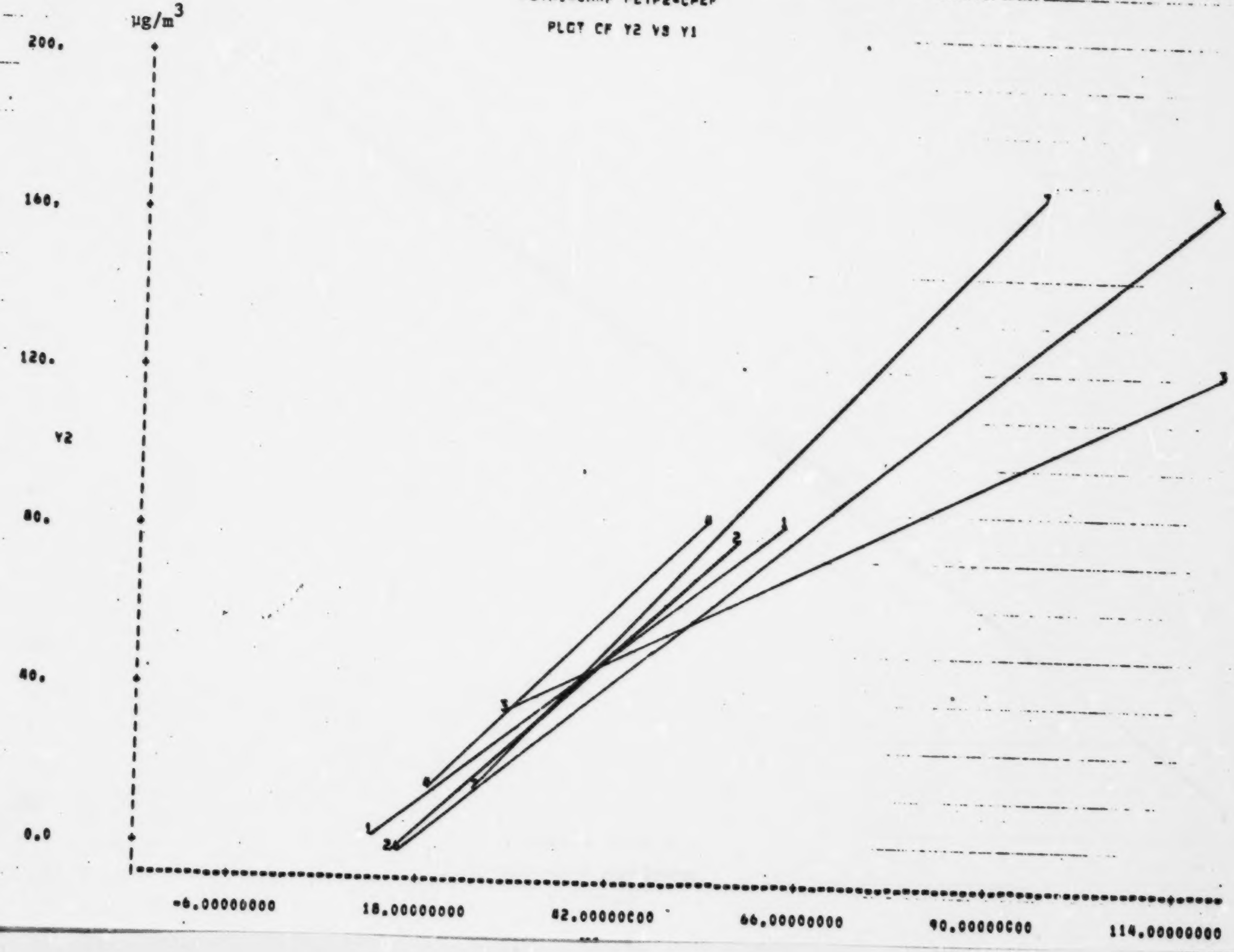


Figure C-2

METH1=CHRF METH2=CHRC

PLOT OF Y2 VS Y1

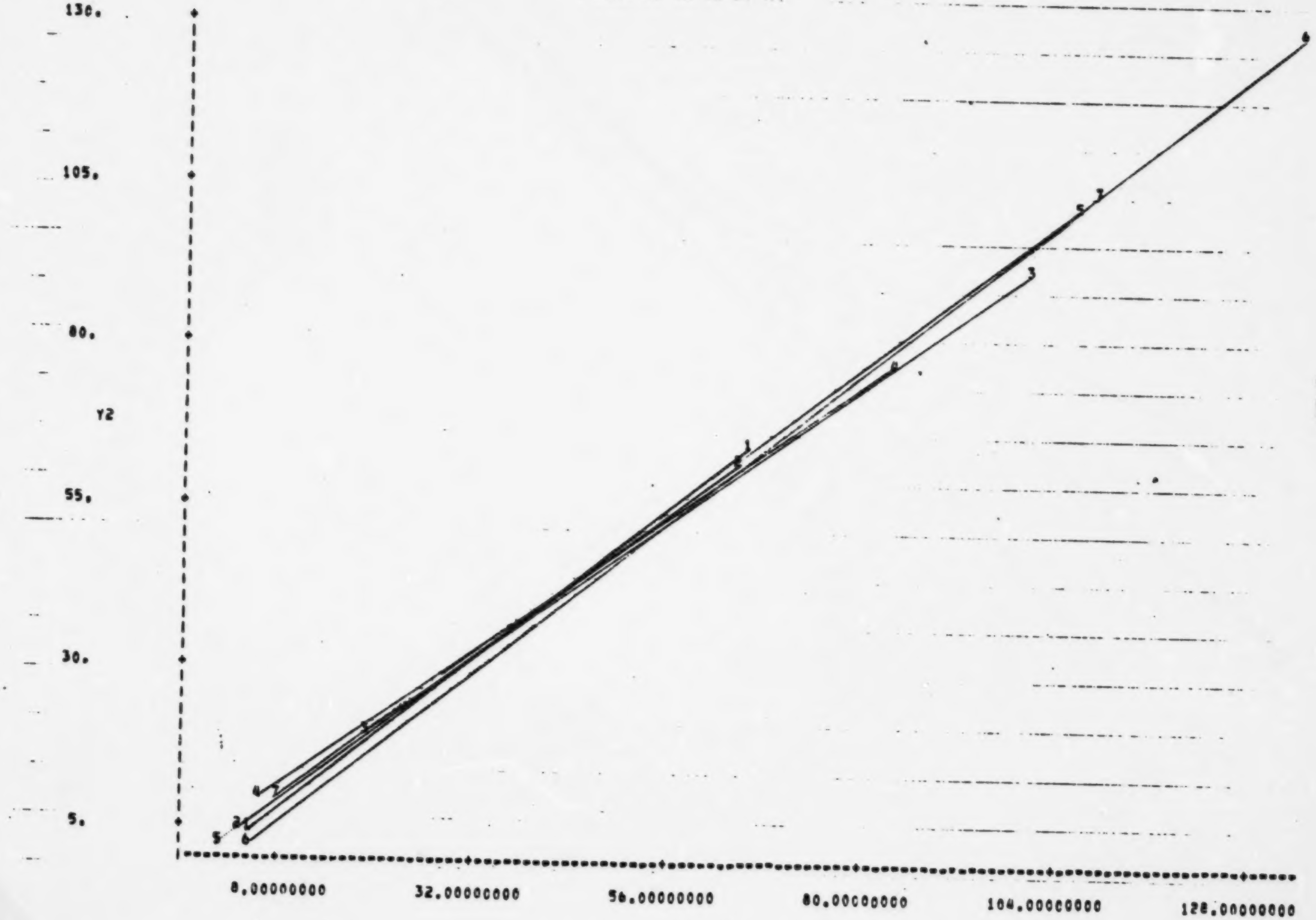


Figure C-3

METH1=CHRF METH2=TECH

PLOT OF Y2 VS Y1

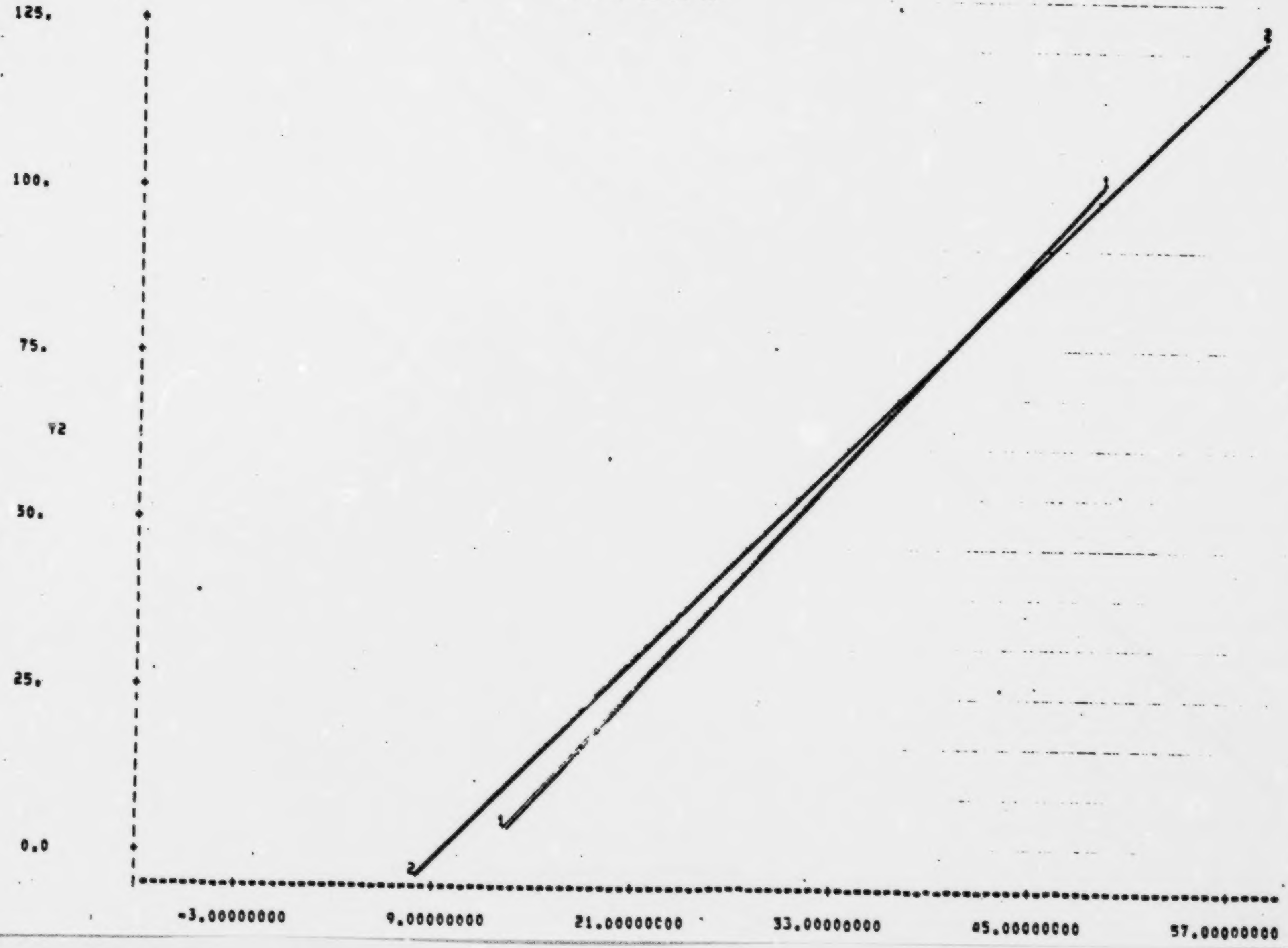


Figure C-4

METH1=CHRF METH2=TECH

PLOT OF Y2 VS Y1

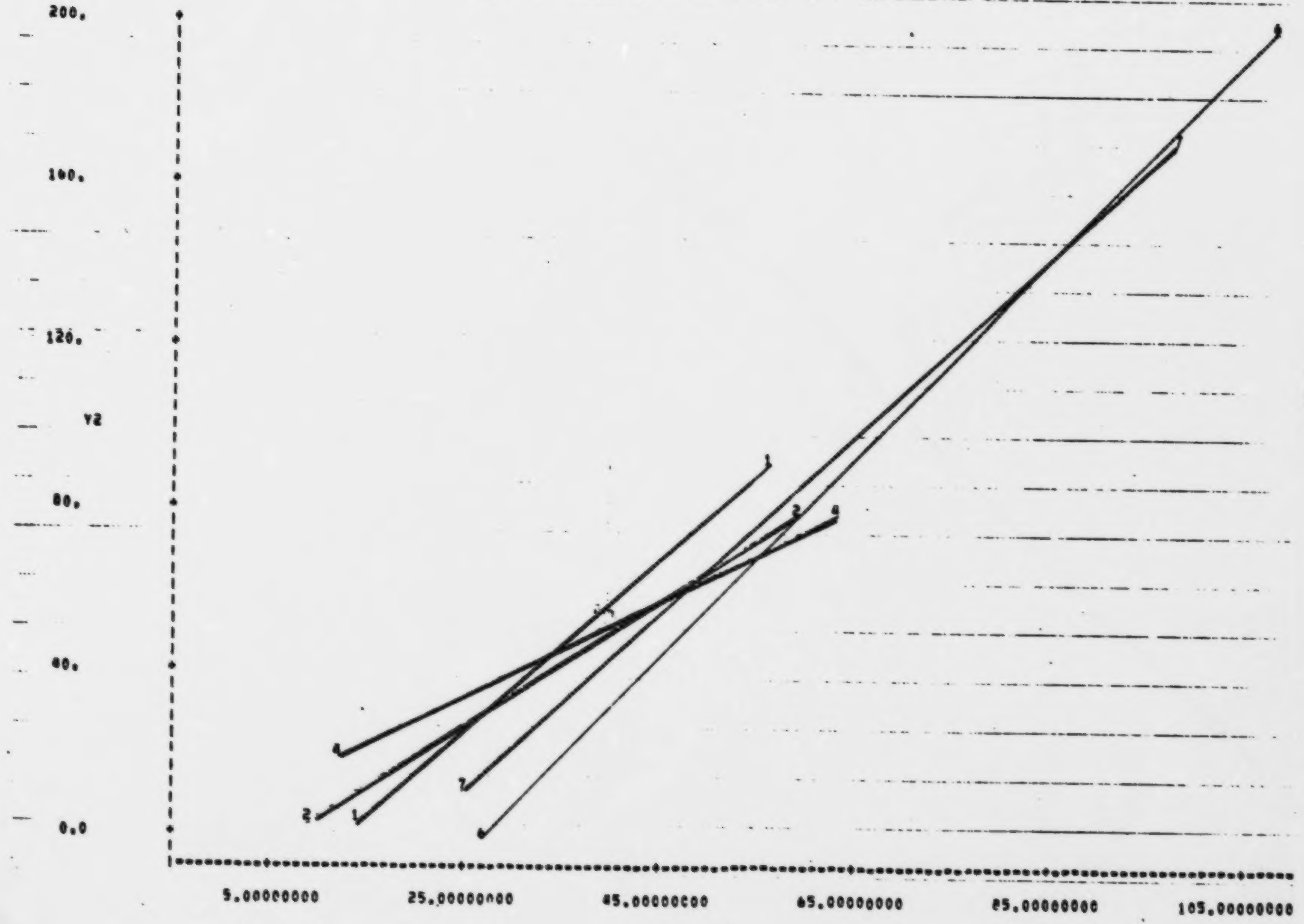


Figure C-5

METH1=CHRF METH2=TGBC

PLOT OF Y2 VS Y1

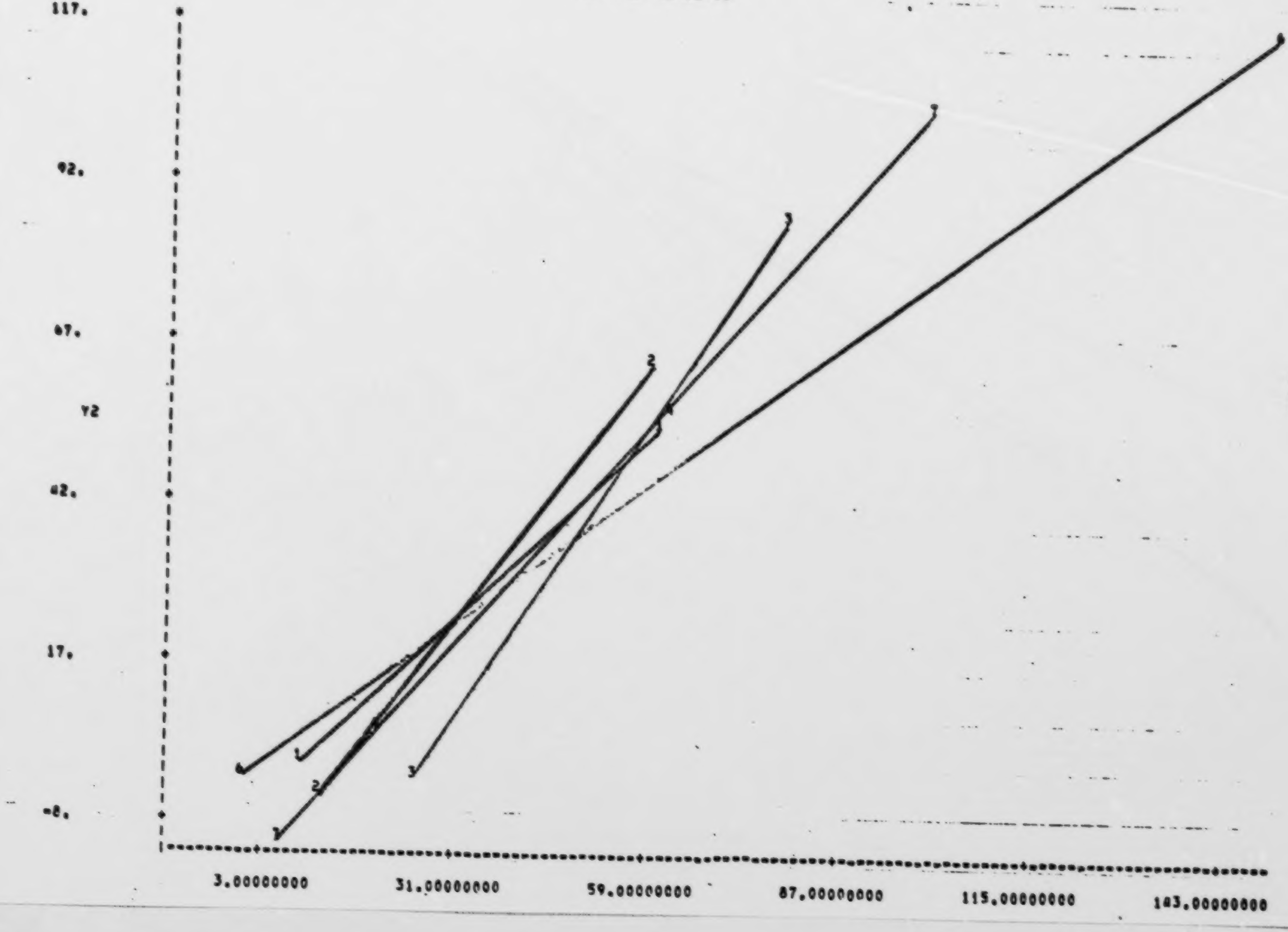


Figure C-6

METH1=CHAP METH2=CHE3SG

PLOT OF Y2 VS Y1

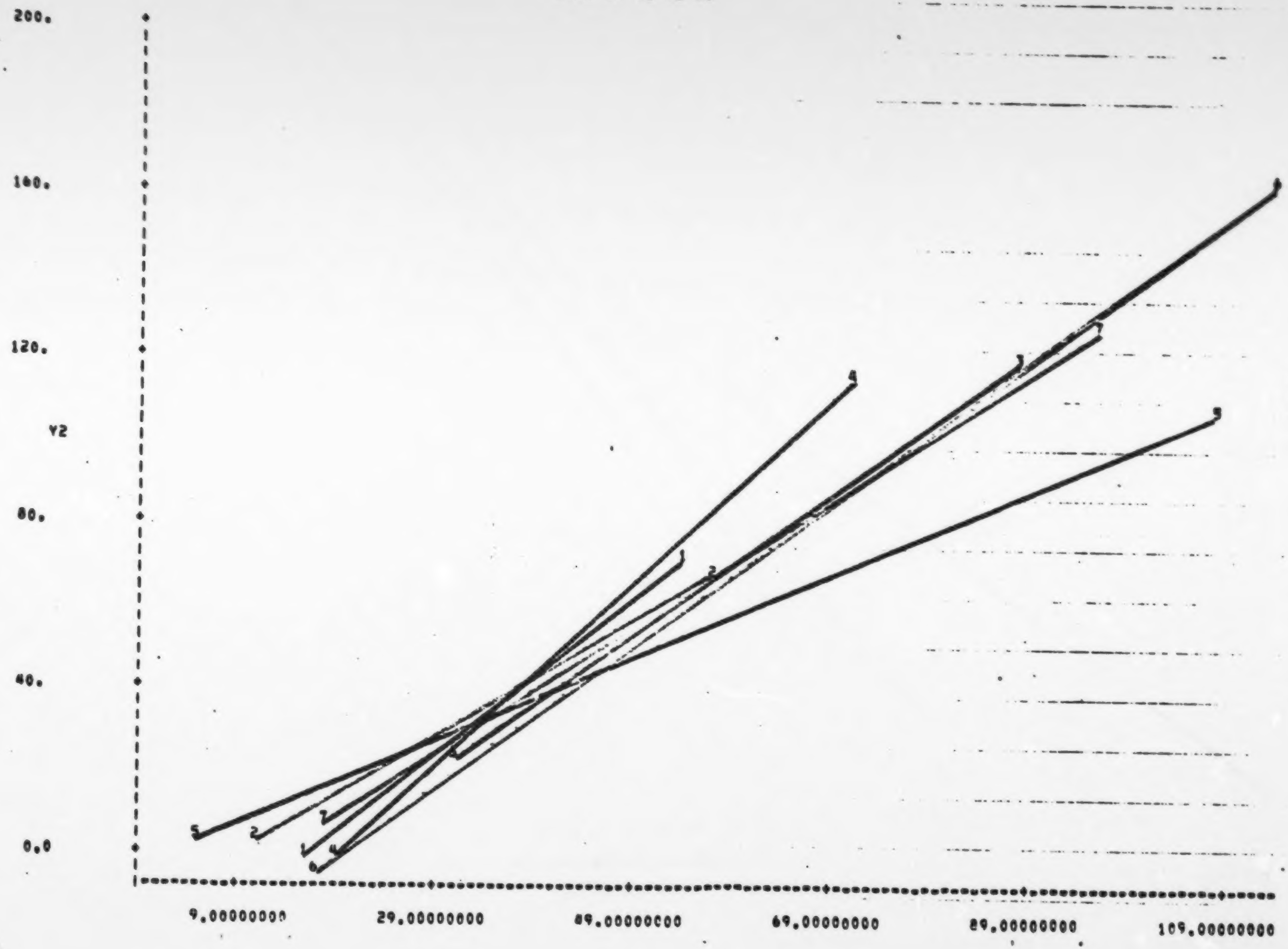


Figure C-7

METH1=CHRO METH2=CHEM

PLOT OF Y2 VS Y1

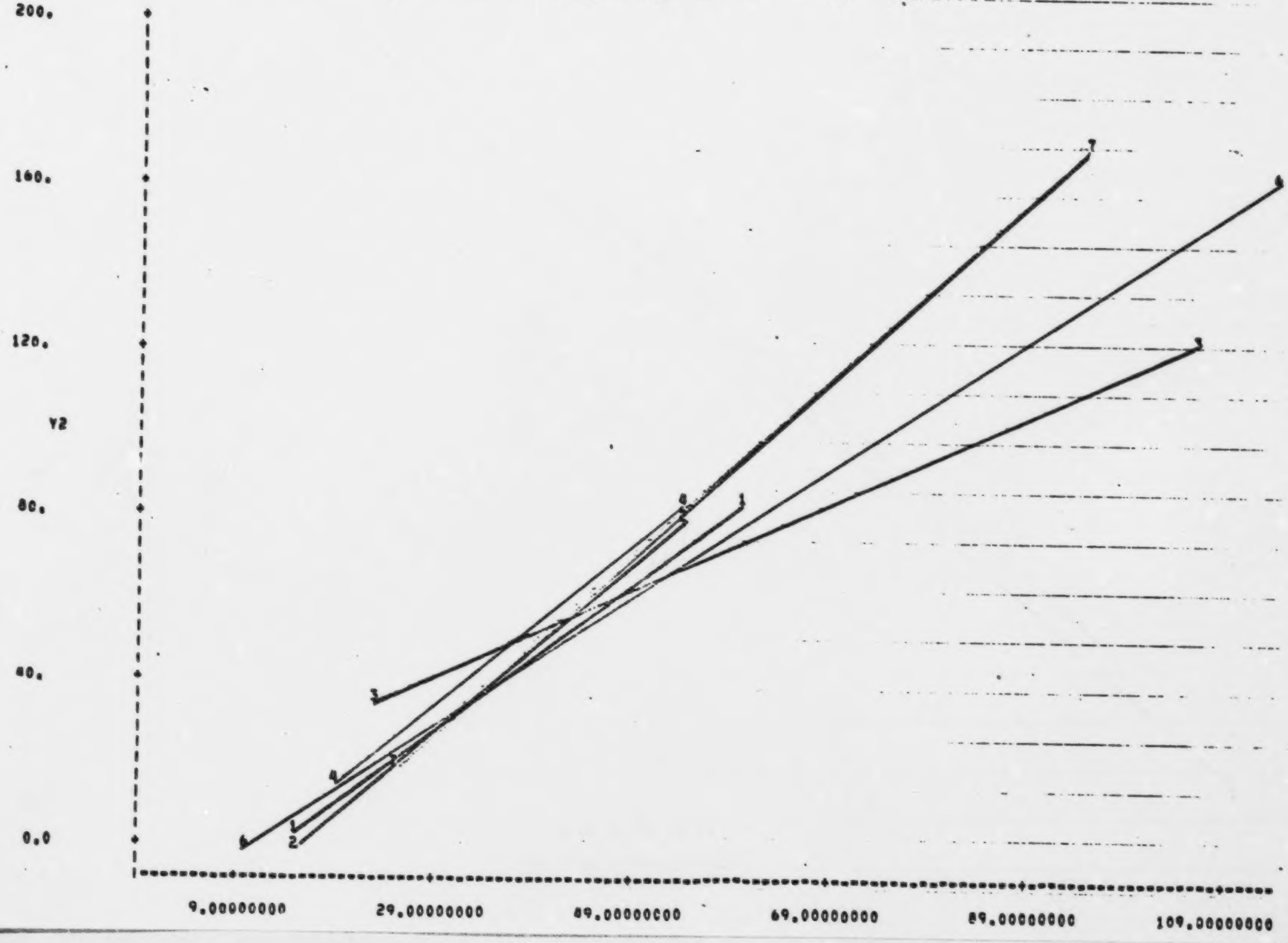


Figure C-8

METH1=CHRC RETF2=TECP

PLOT OF Y2 VS Y1

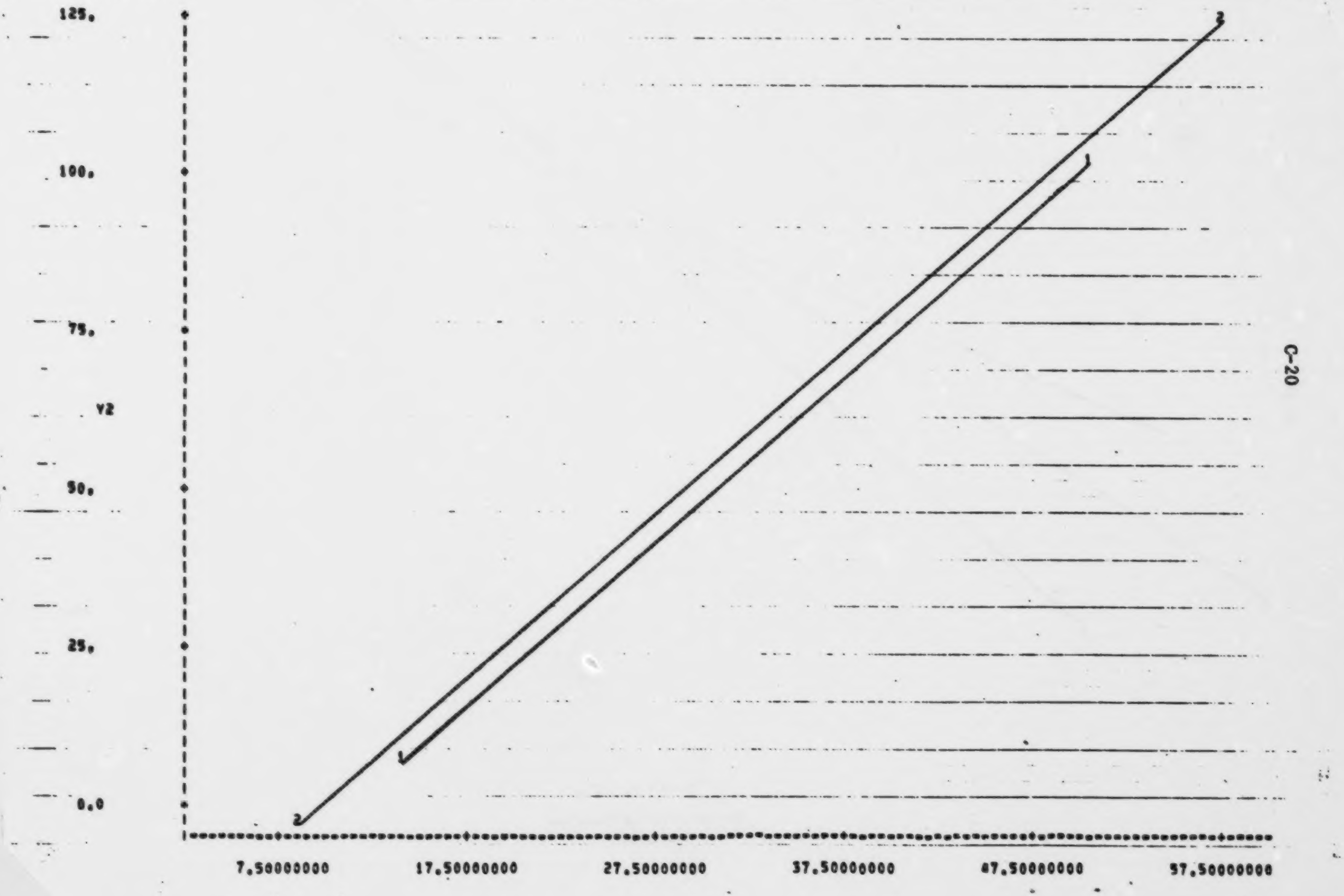


Figure C-9

METH1=CHRO METH2=TFCA

PLOT OF Y2 VS Y1

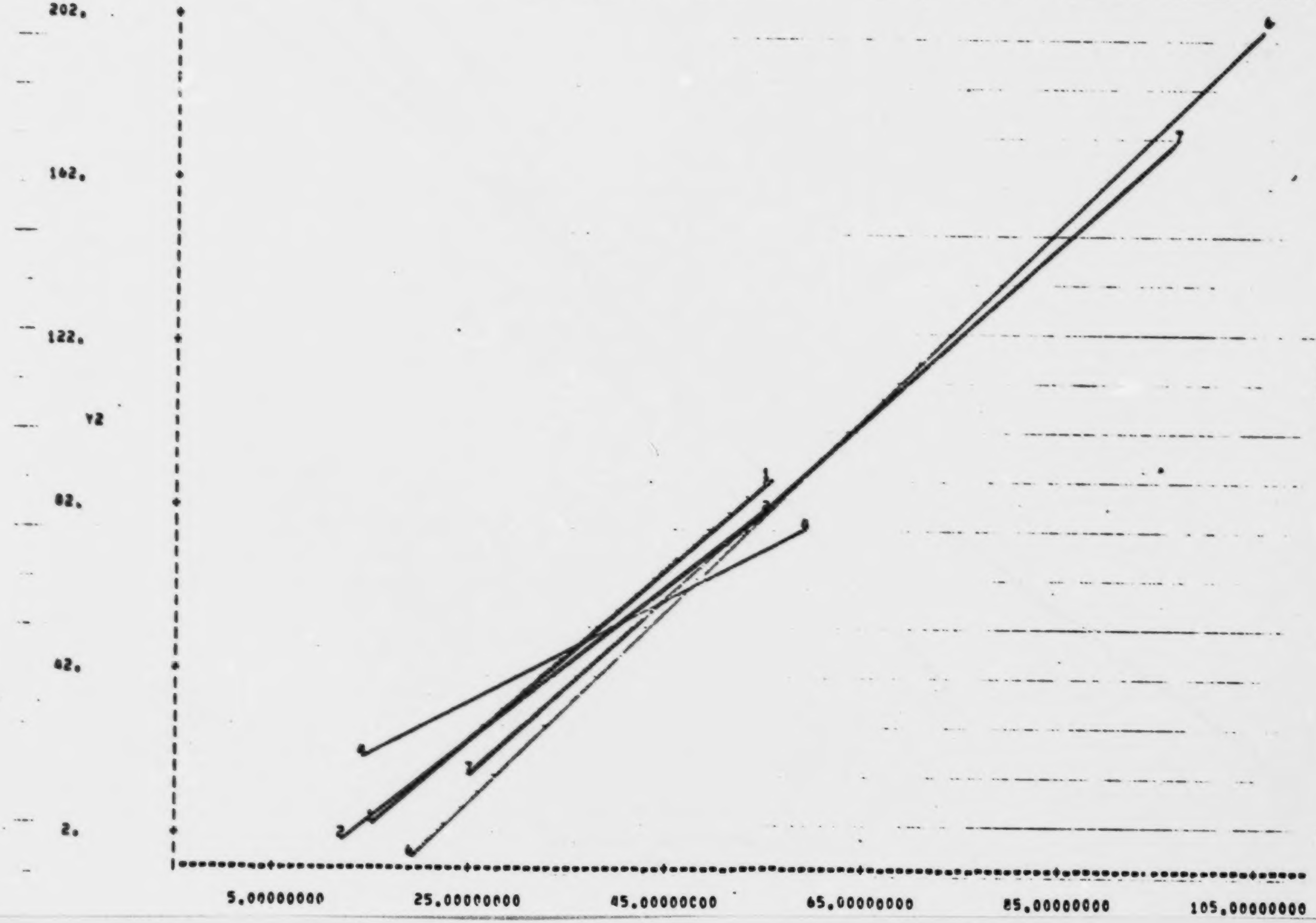


Figure C-10

METH1OCHRC PET1-2*TGOC

PLOT OF Y2 VS Y1

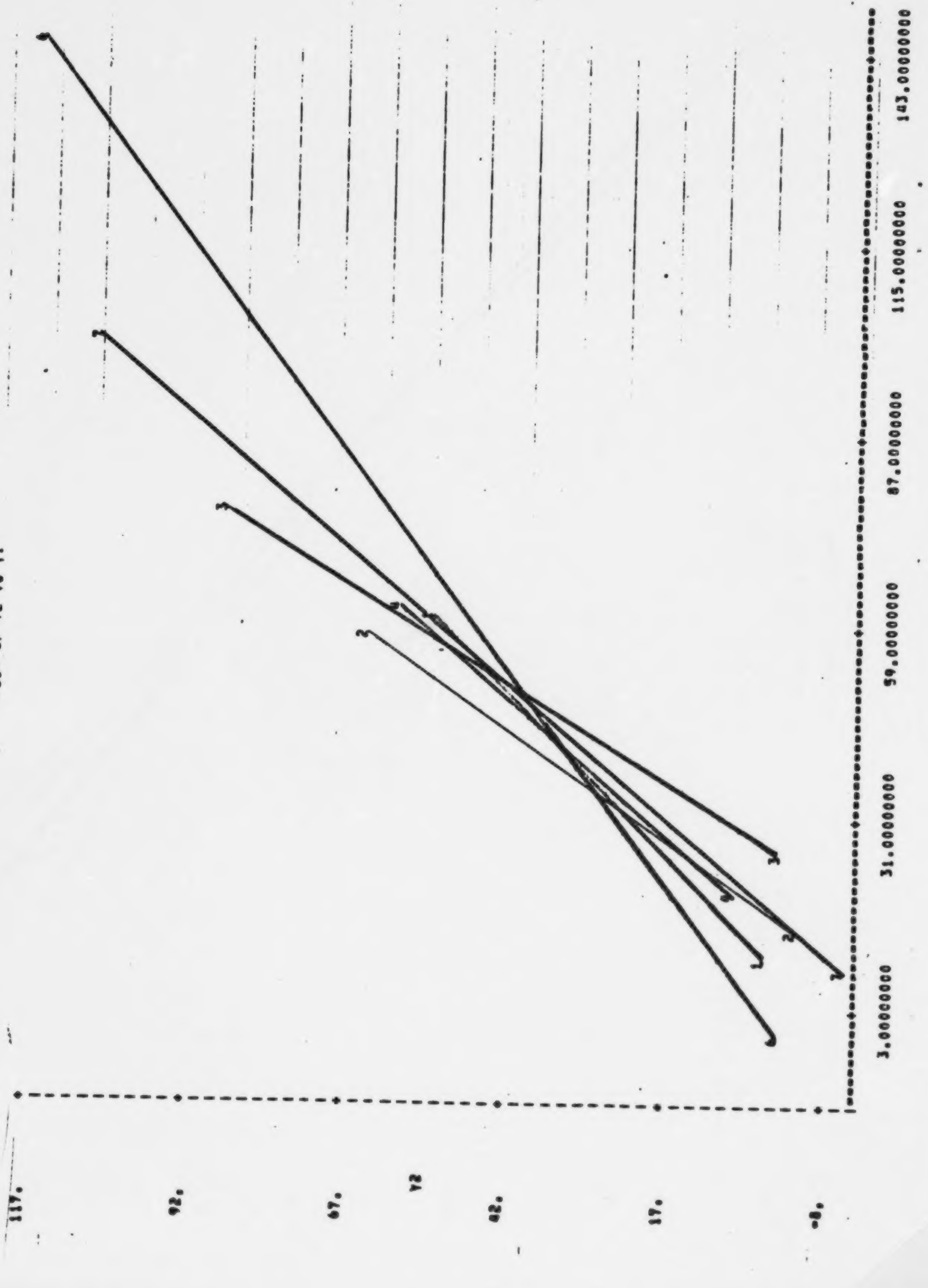
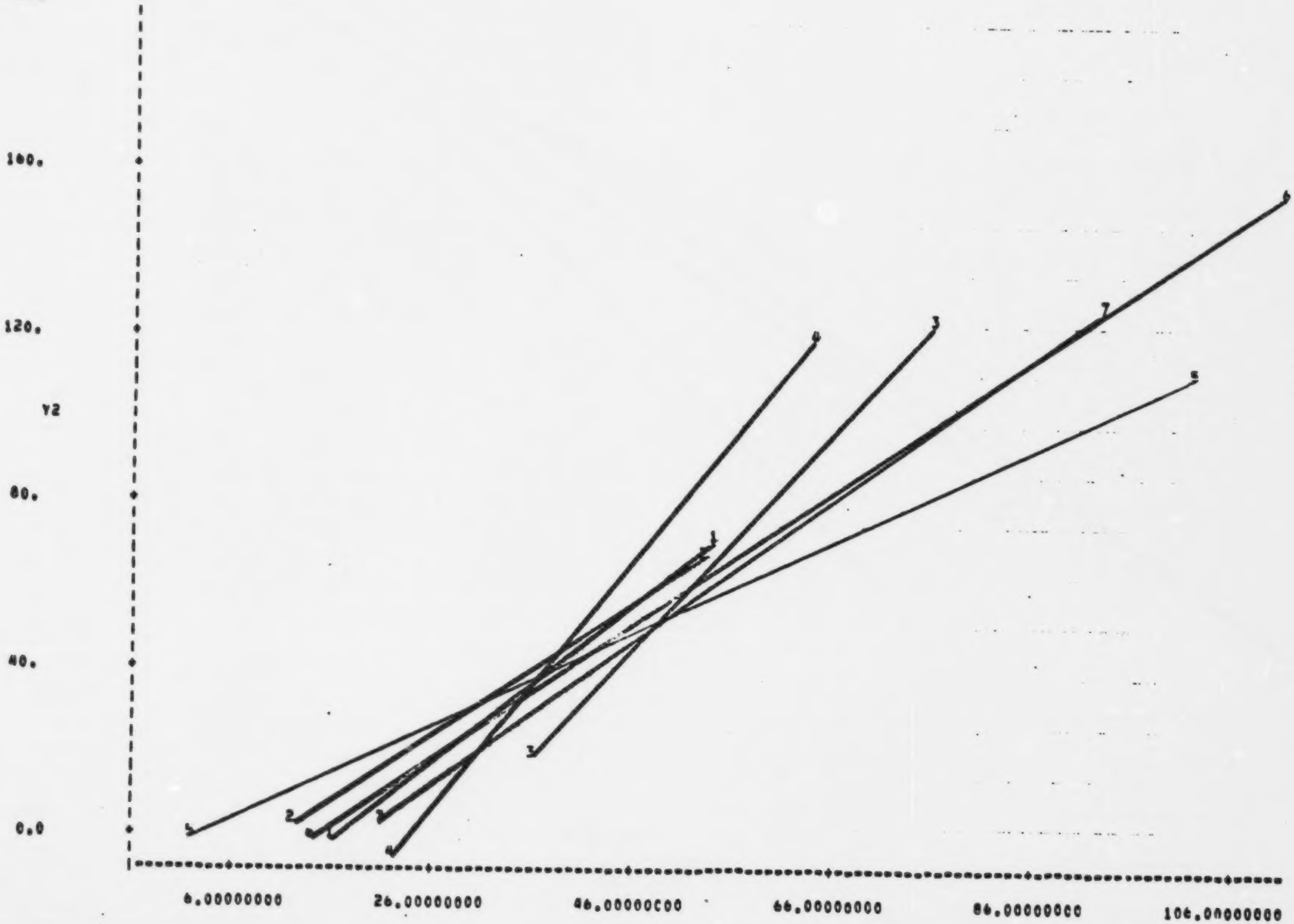


Figure C-11

METH1=CHRO METH2=CHE380

PLOT OF Y2 VS Y1



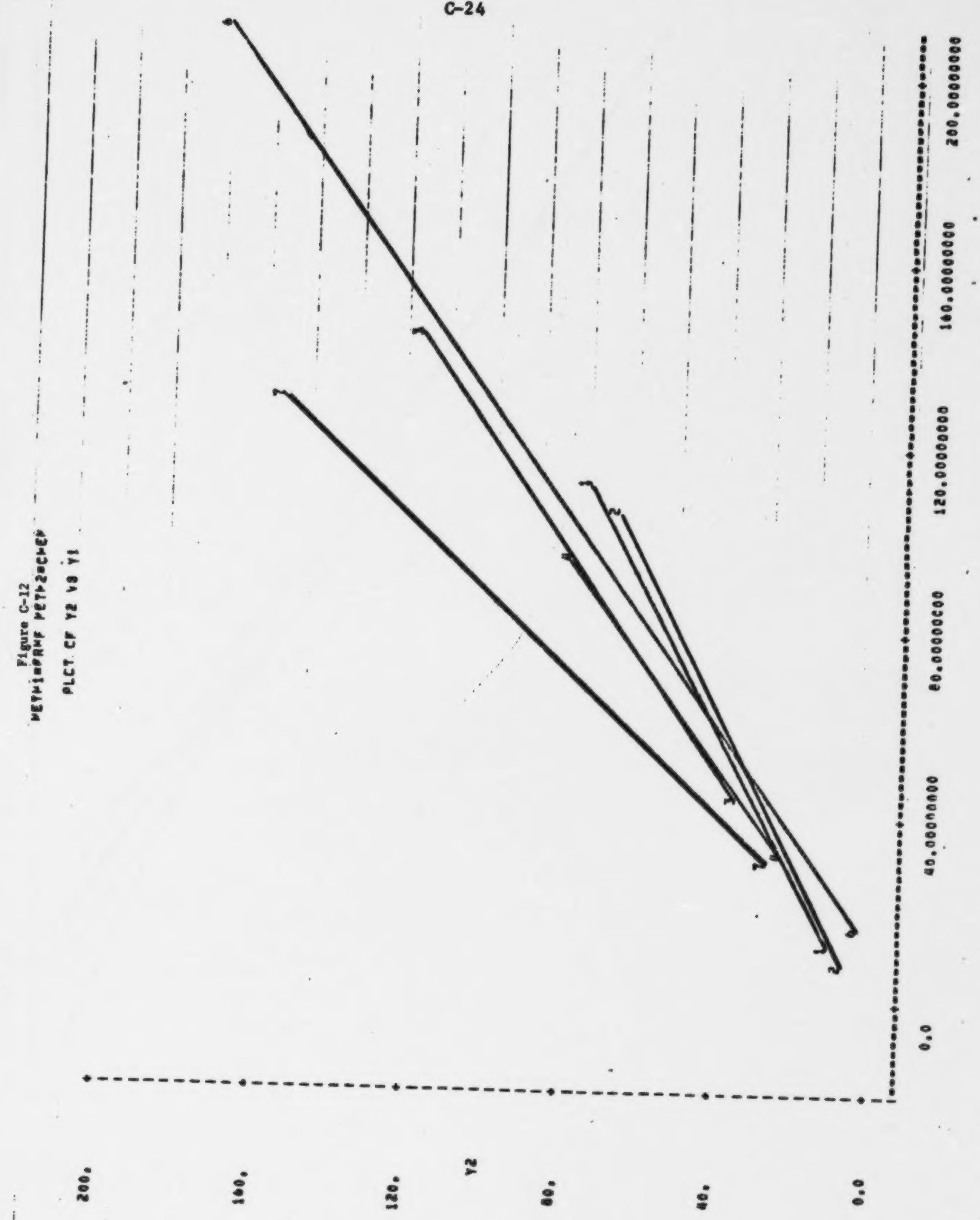


Figure C-12
METH1BPRAF METH2BCHEP

PLOT OF Y2 VS Y1

Figure C-13
METH1=FRMF METH2=CHRF

PLOT OF Y2 VS Y1

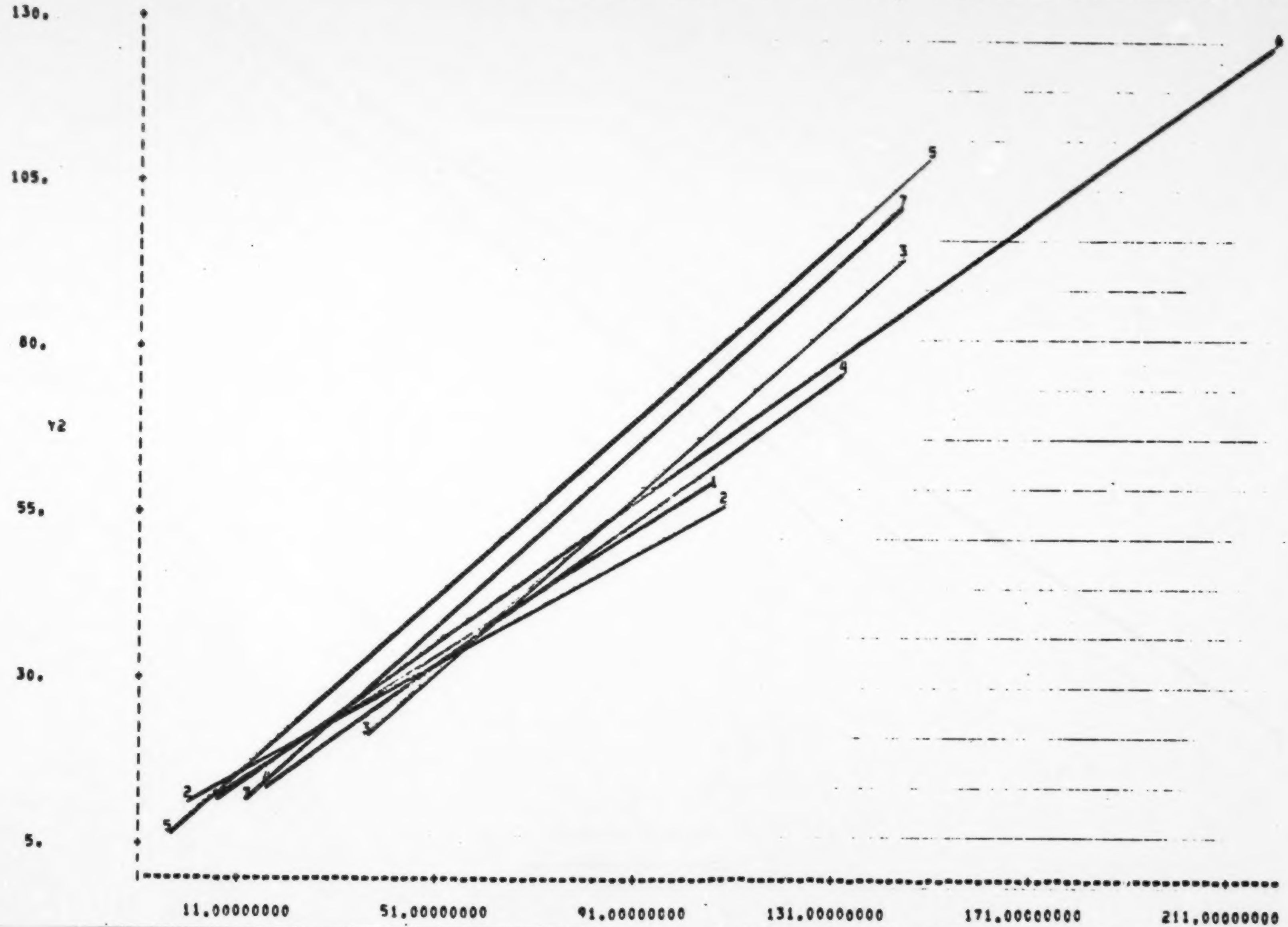


Figure C-14

METH1=PRMF METH2=CHRC

PLOT OF Y2 VS Y1

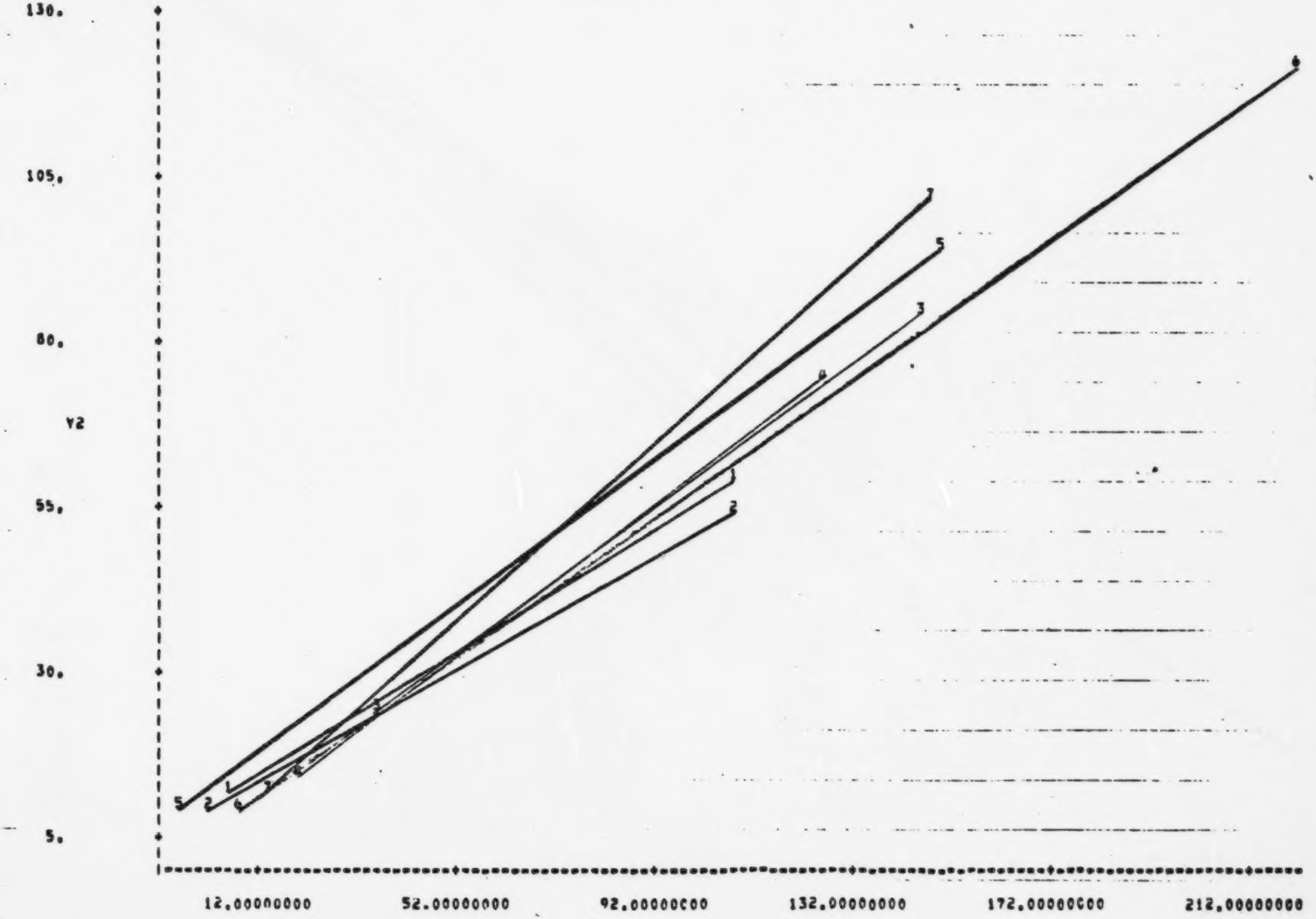


Figure C-15

METH1=PRMF METH2=TEAP

PLOT OF Y2 VS Y1

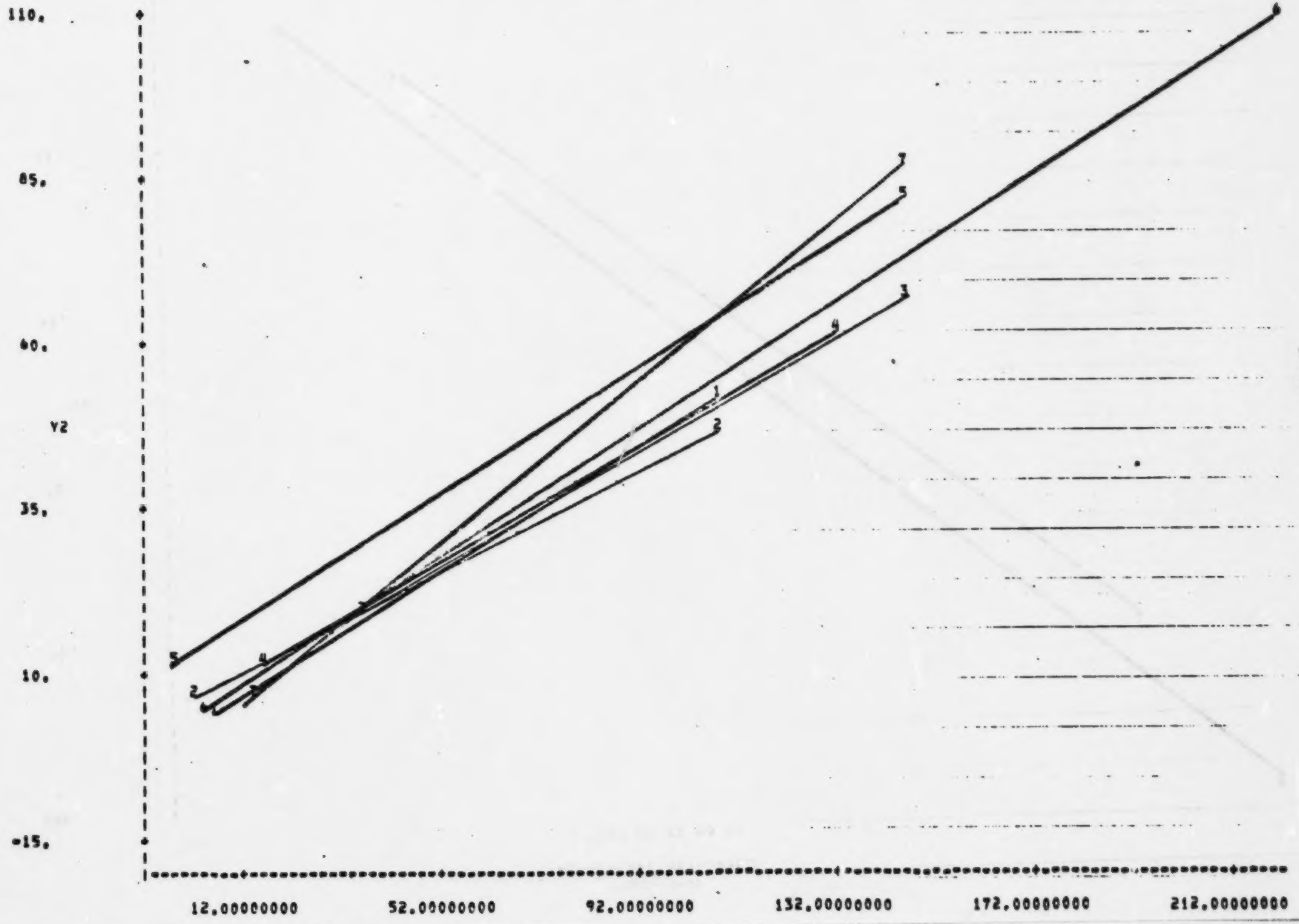
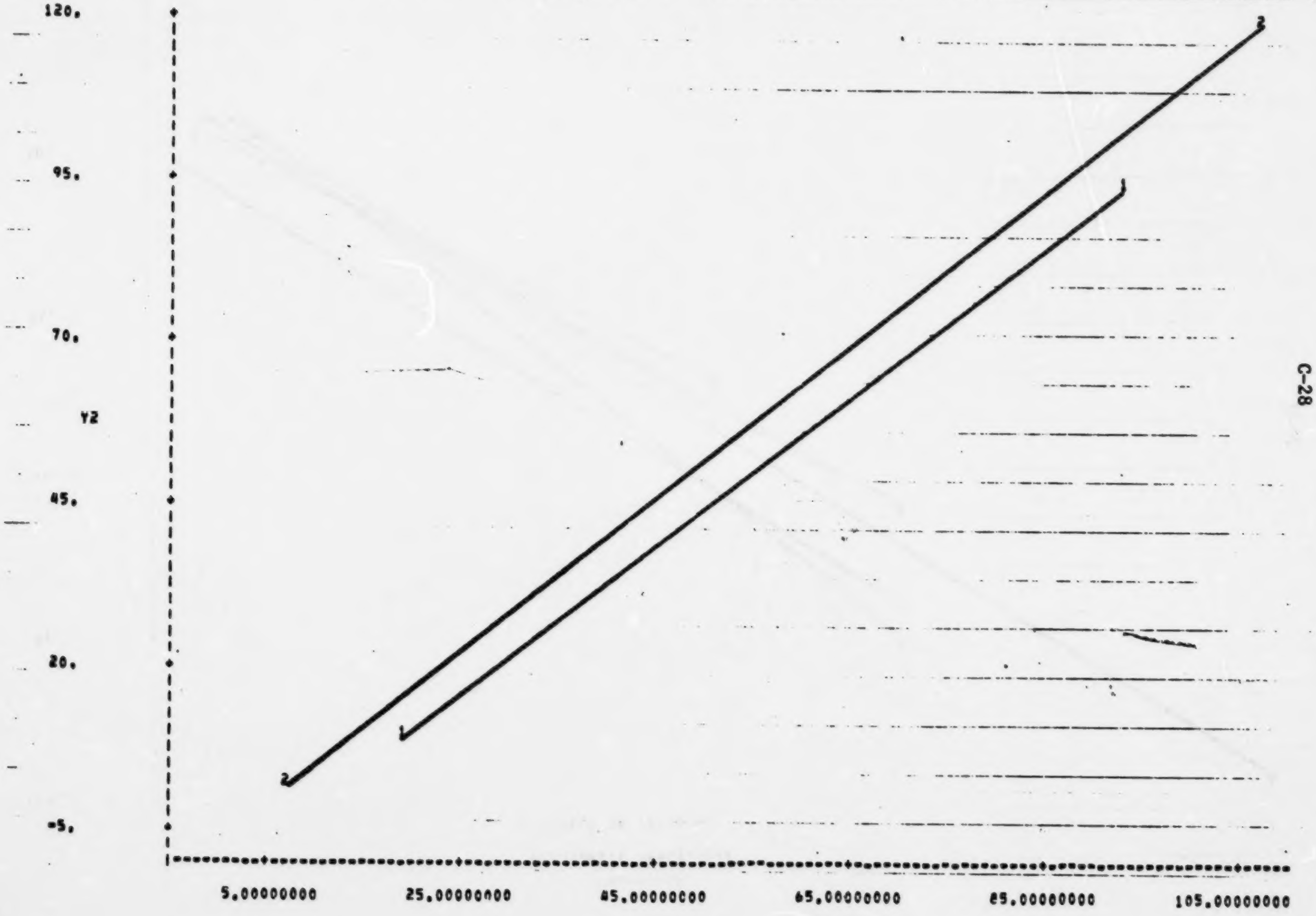


Figure C-16

METH1=FRMF METH2=TECH

PLOT OF Y2 VS Y1



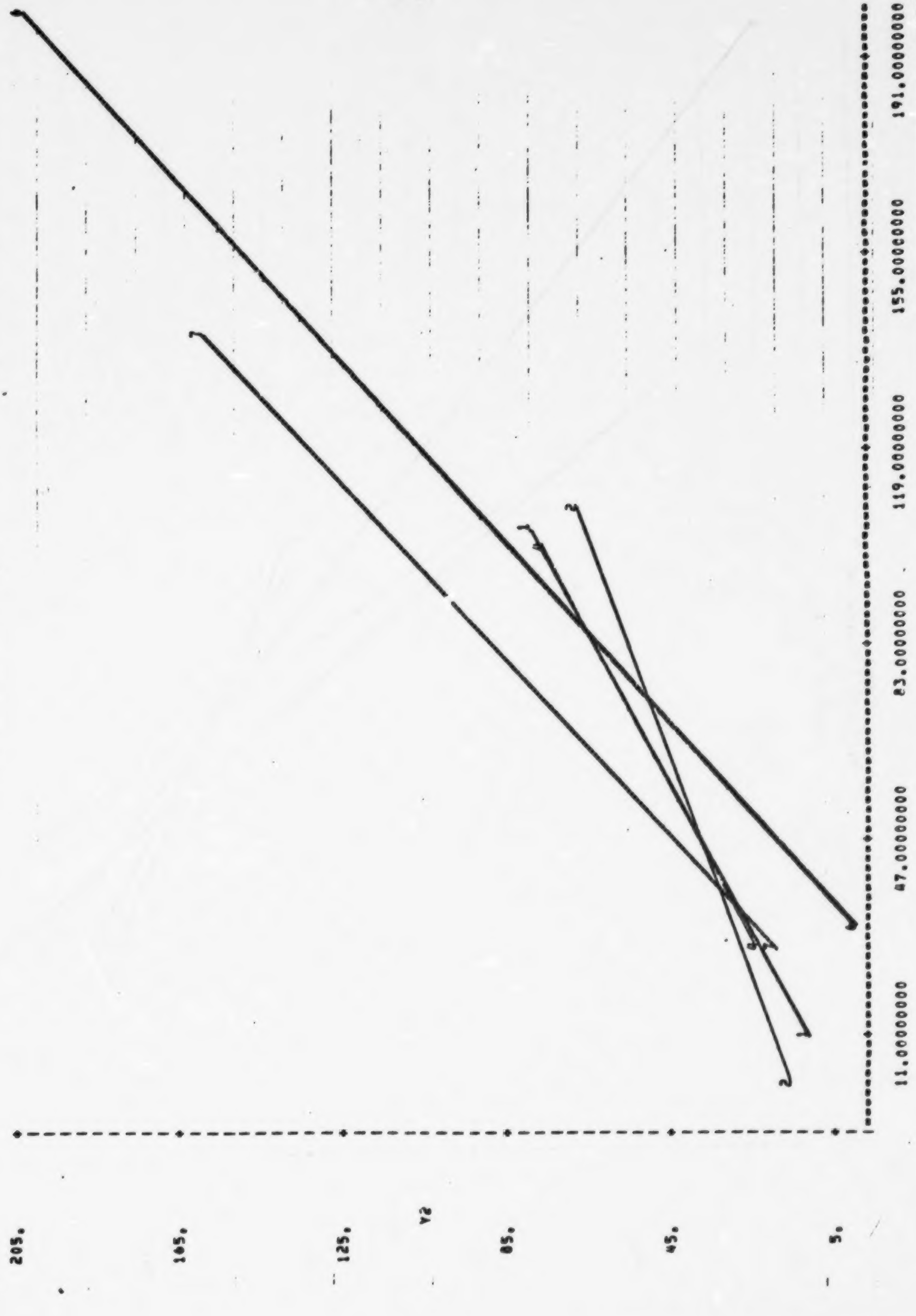


Figure C-17

METH1=PRMF METH2=TEC4

PLOT OF Y2 VS Y1

Figure C-18

METH1=PRMF METH2=TG8C

PLOT OF Y2 VS Y1

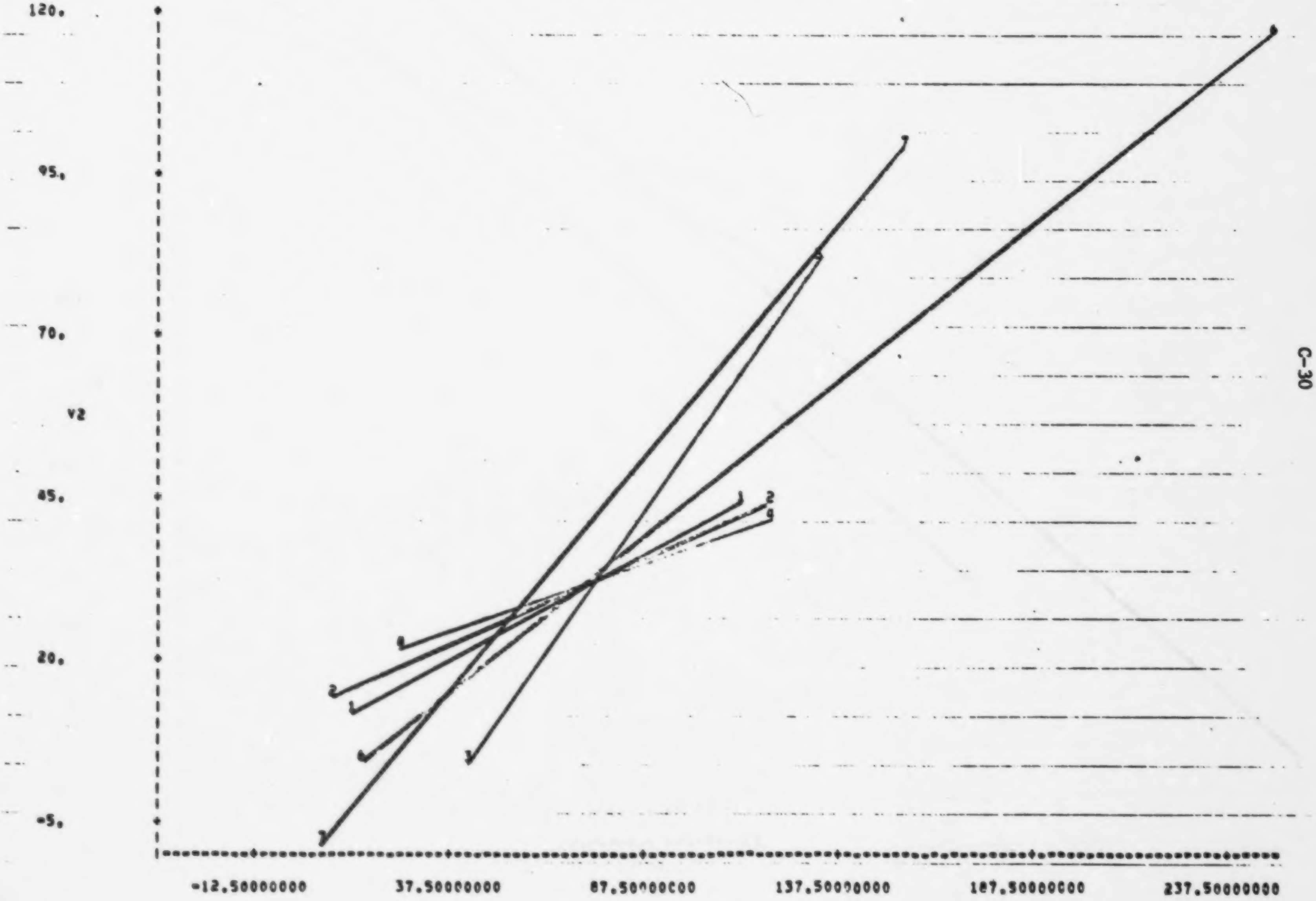


Figure C-19

METH1=FRMF METH2=CHESSC

PLOT OF Y2 VS Y1

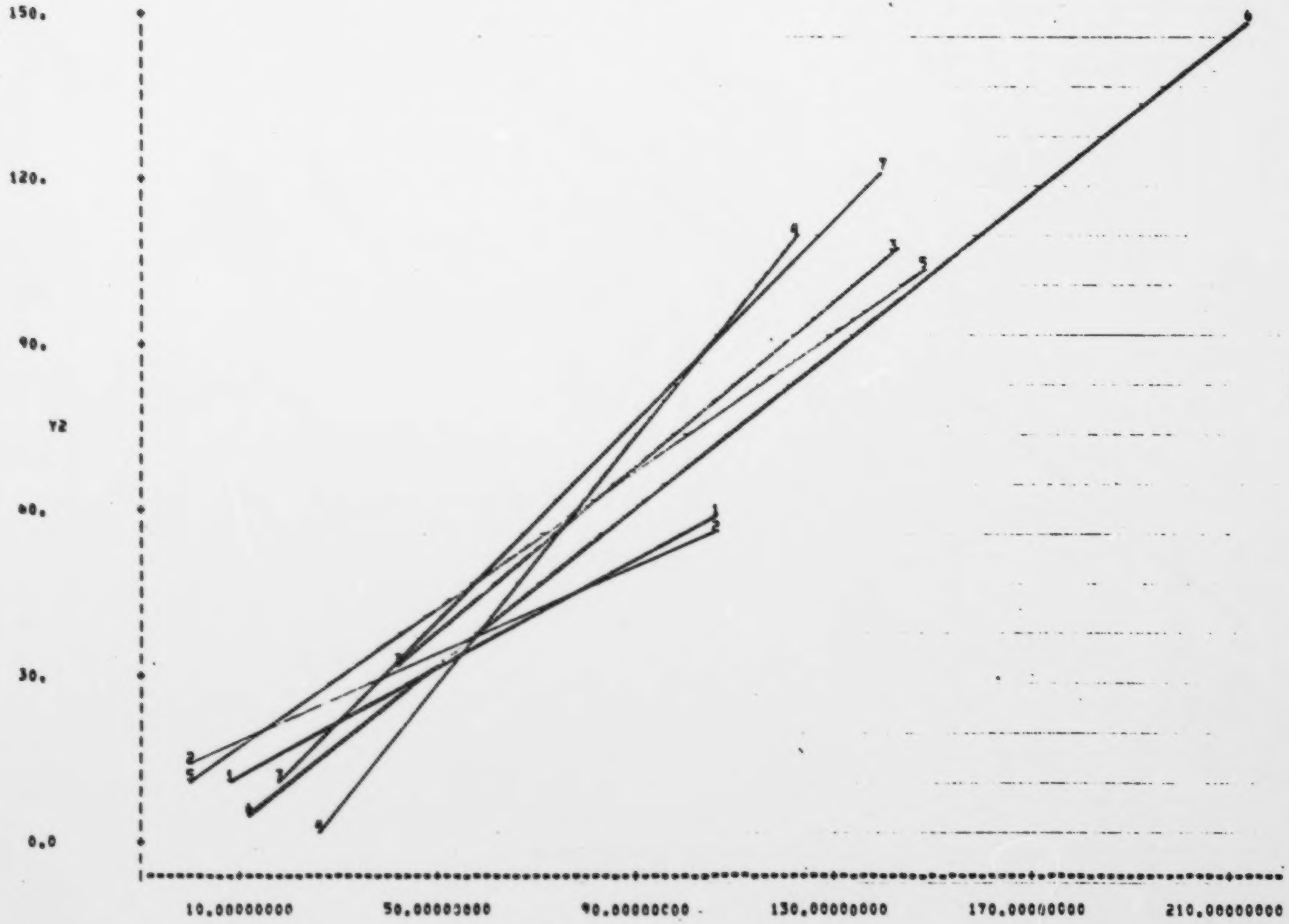


Figure C-20

METHIOYEAF PETH2*CHEF

PLOT CF Y2 VS Y1

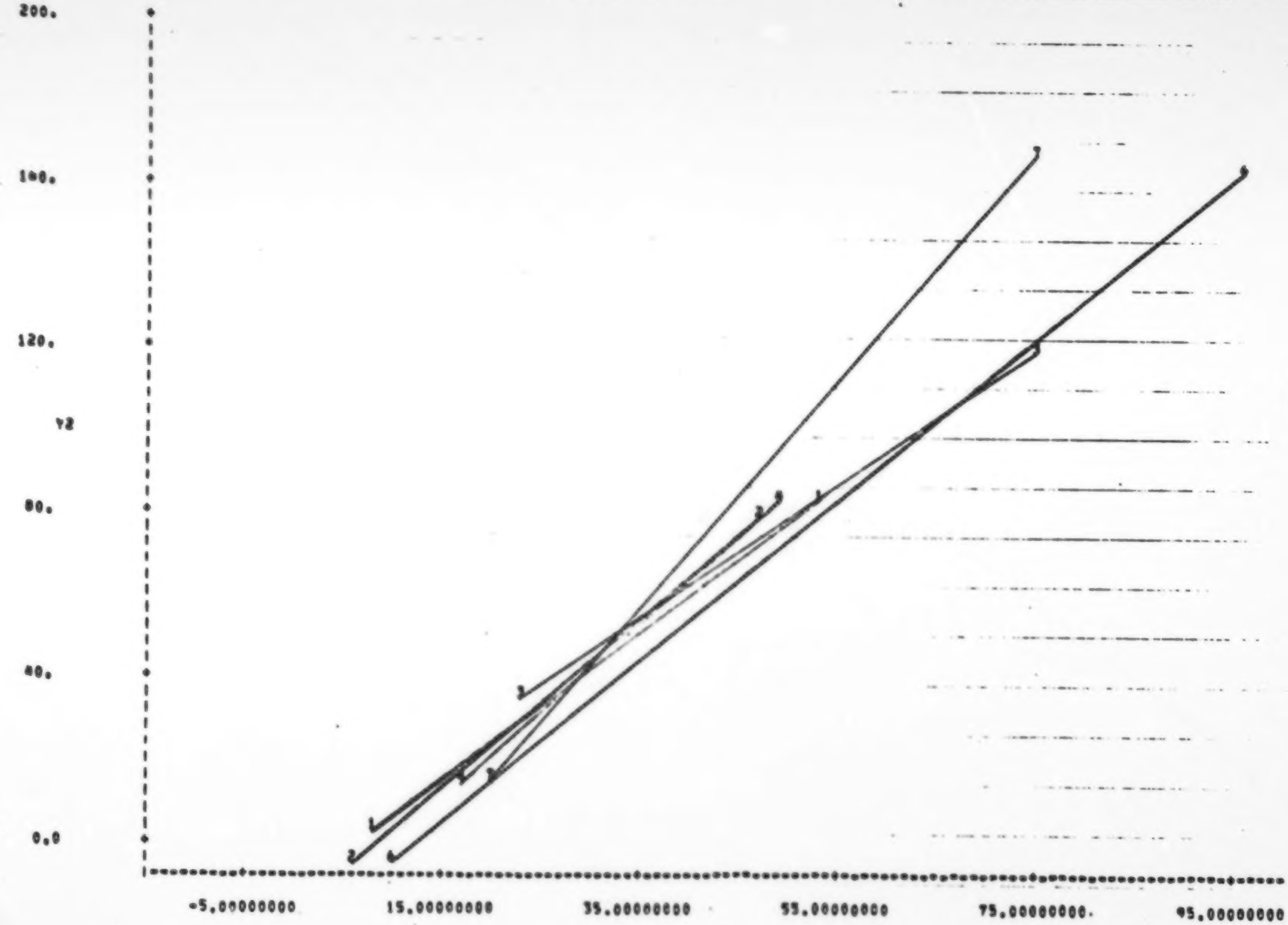


Figure C-21

METHISTEAP METHSOCHMP

PLOT CF Y2 VS Y1

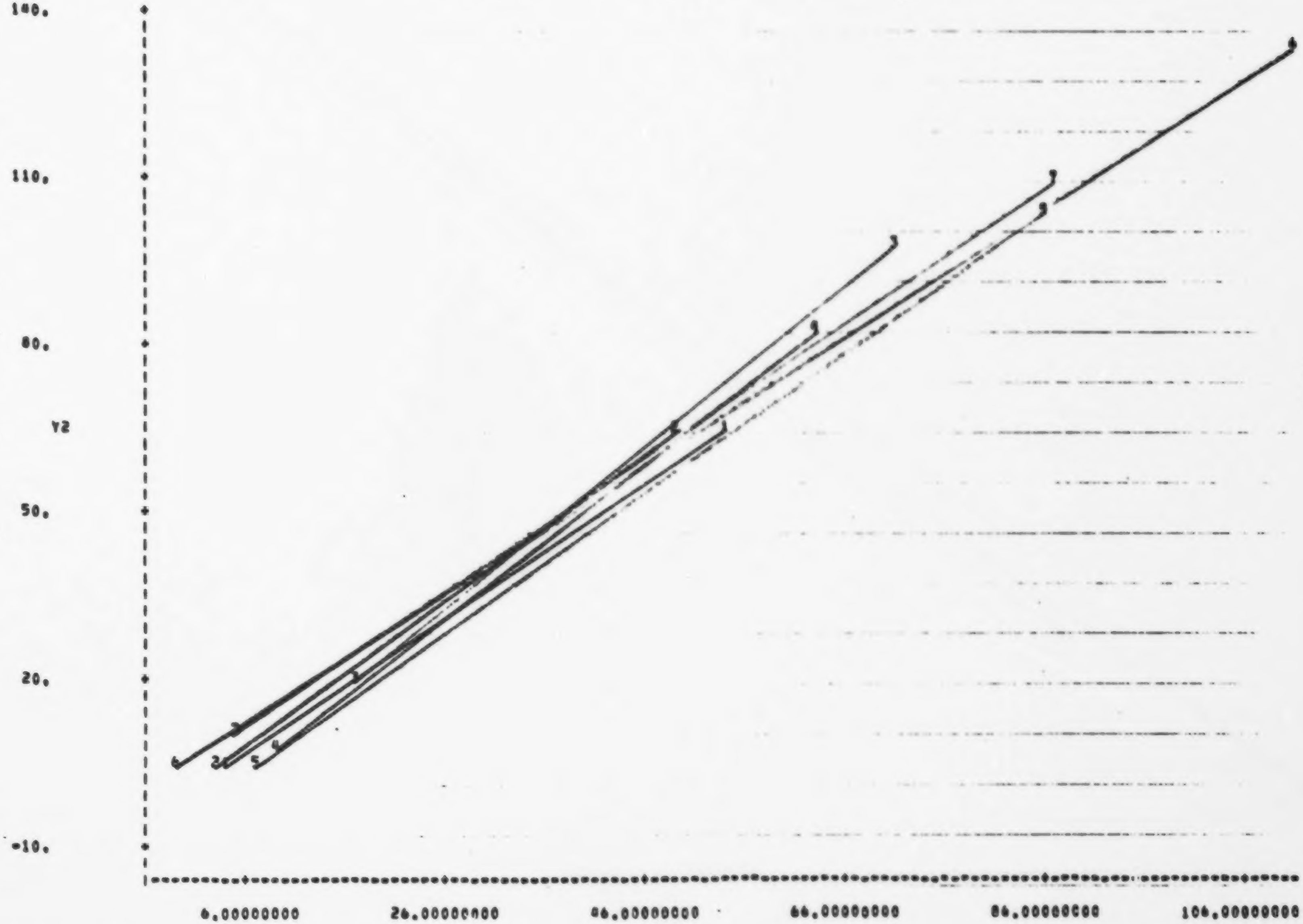


Figure C-22

METHINTEAF METH2ECHRC

PLOT CF V2 VS V1

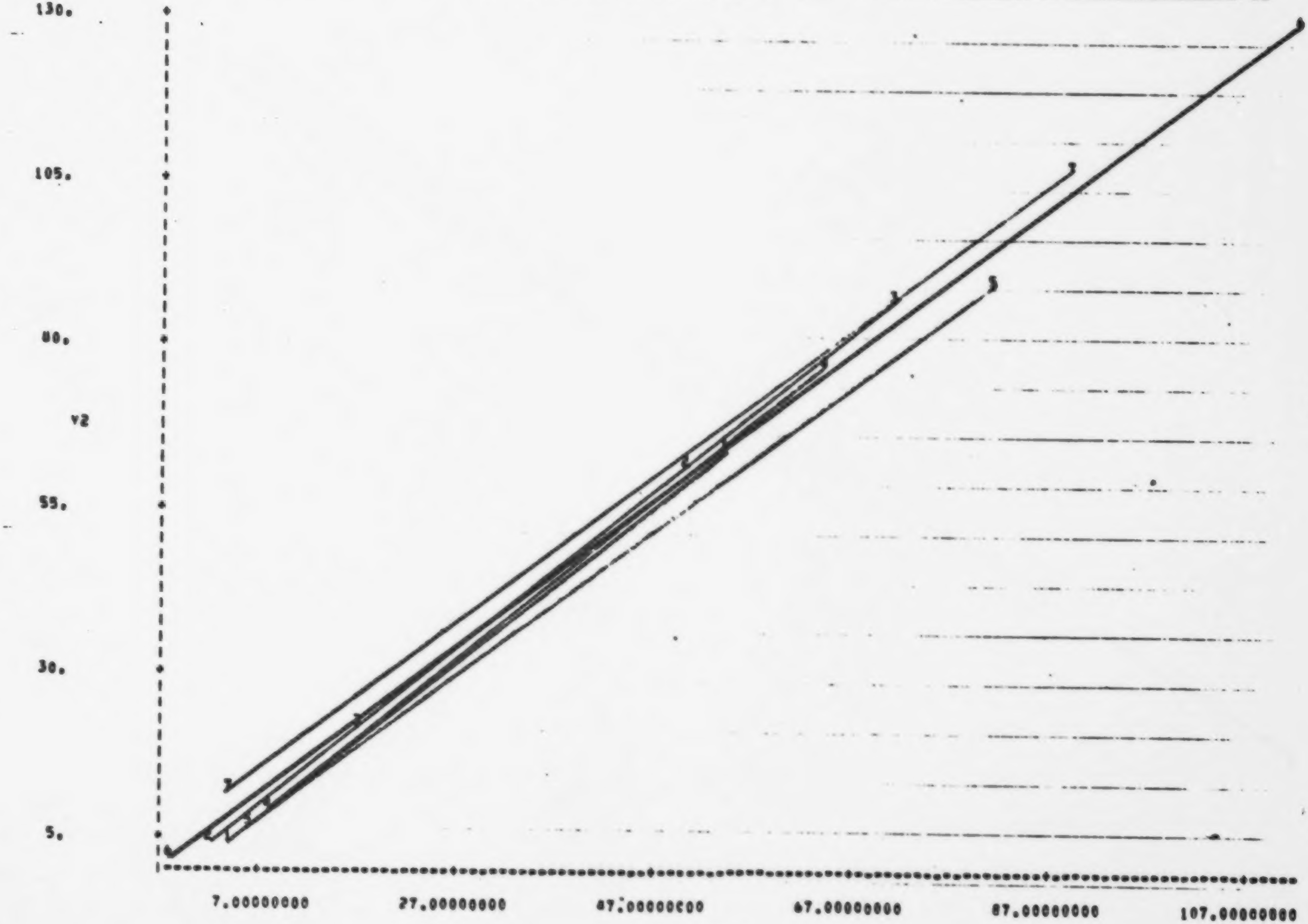


Figure C-23

METH1=TEAP METH2=TECP

PLOT OF Y2 VS Y1

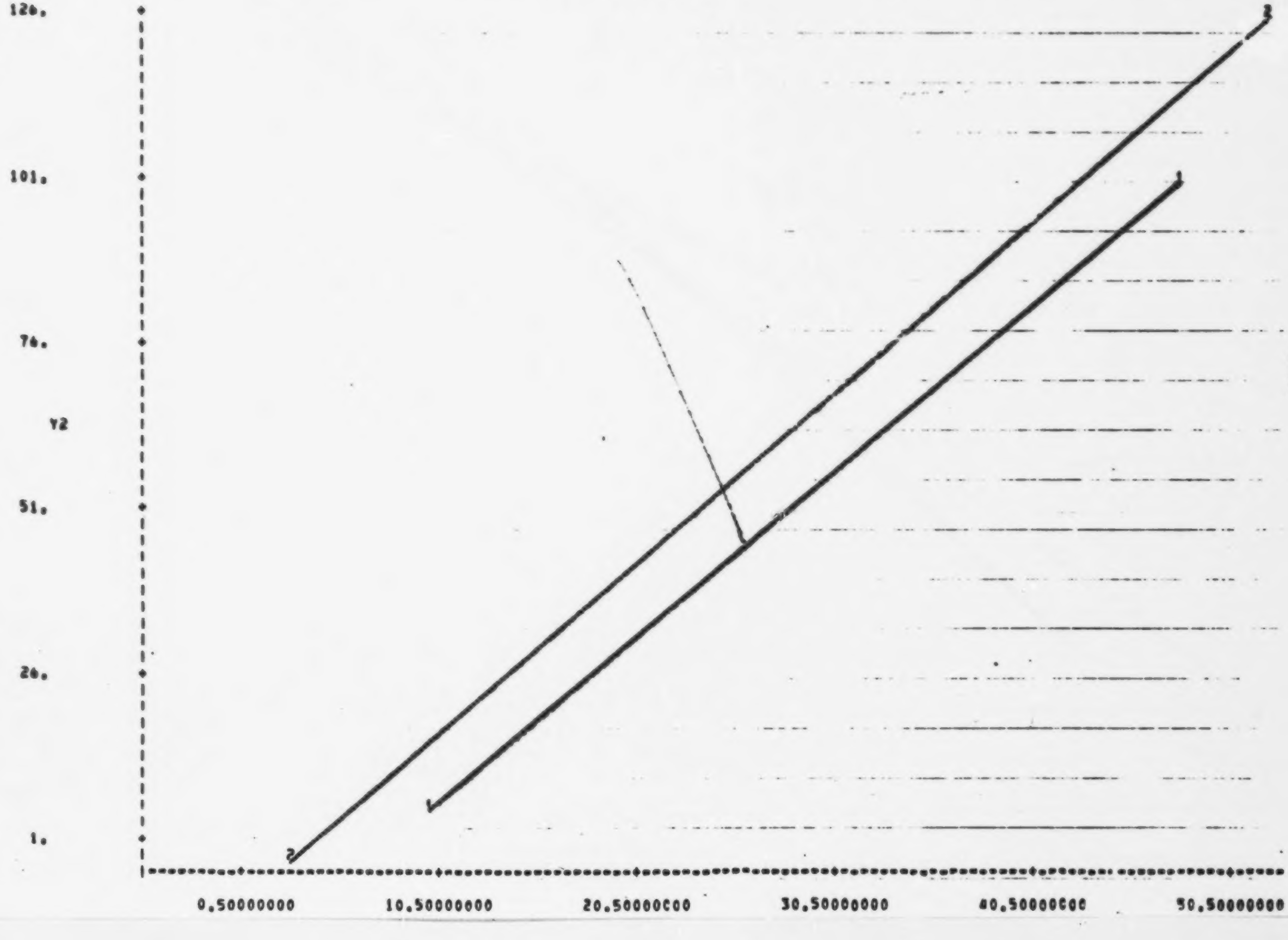


Figure C-24

METH1=TEAF METH2=TEC4

PLOT OF Y2 VS Y1

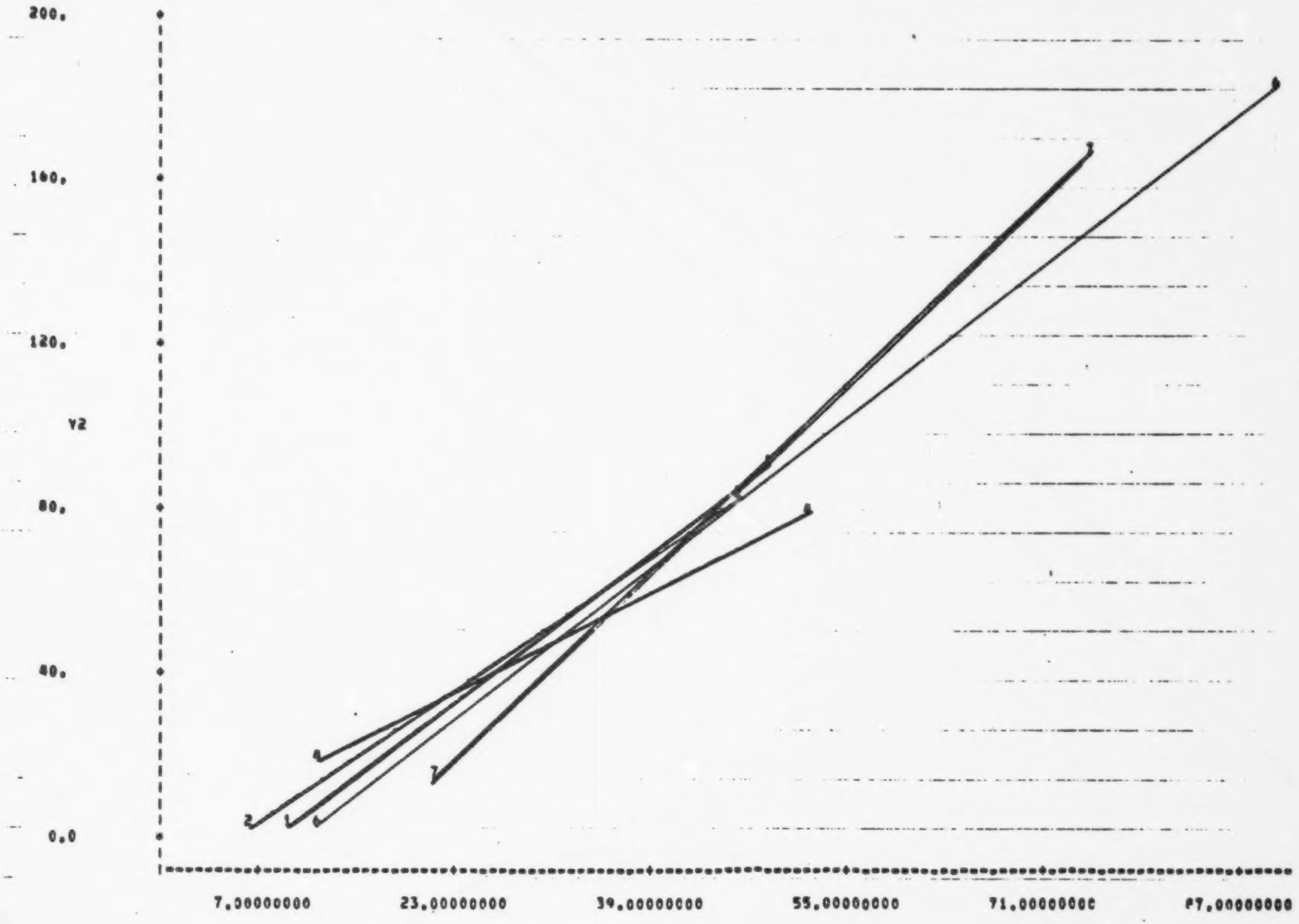


Figure C-25

METH1=TEAF METH2=TGSC

PLOT OF Y2 VS Y1

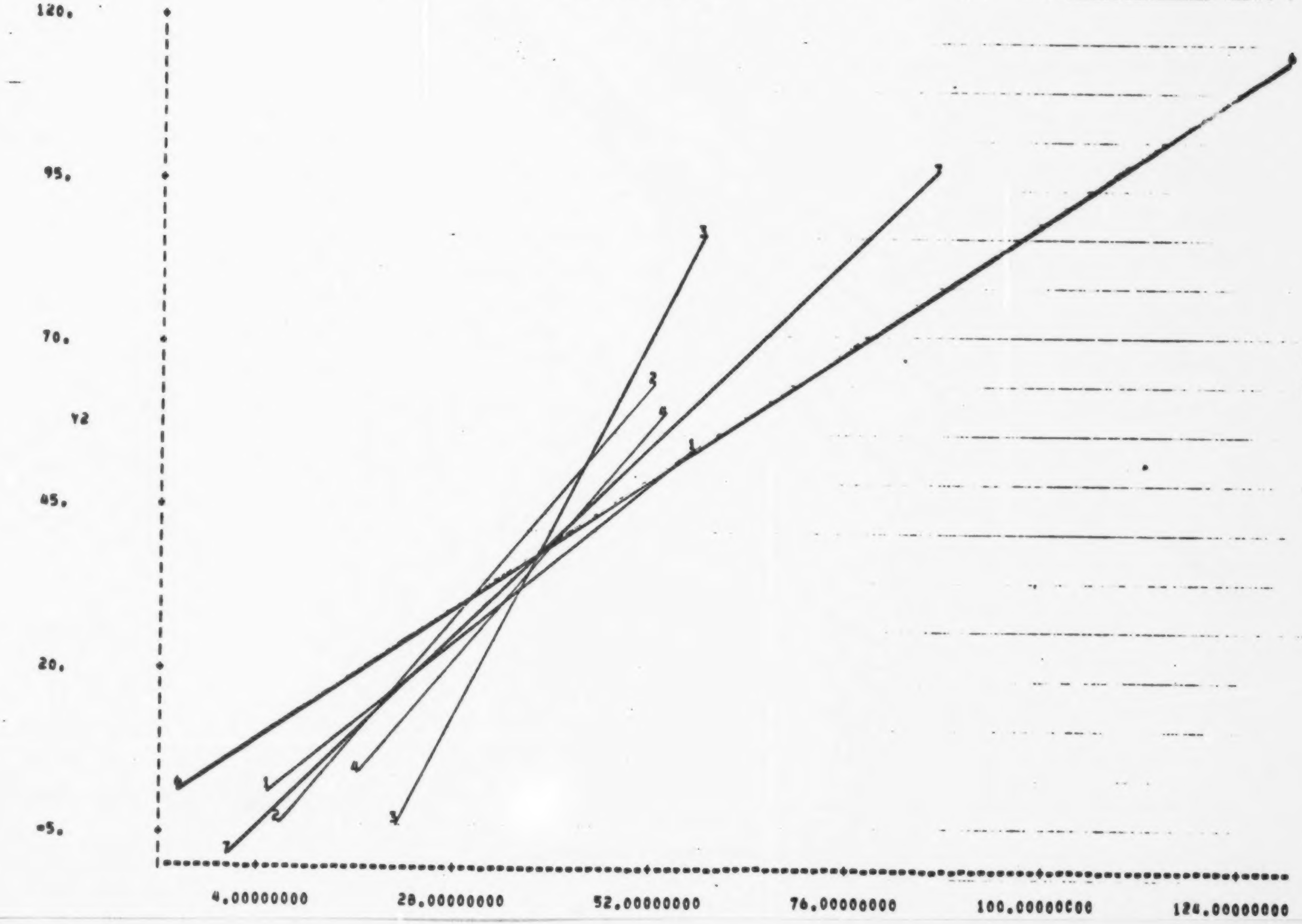


Figure C-26

METH1=TEAP METH2=CHE820

PLOT OF Y2 VS Y1

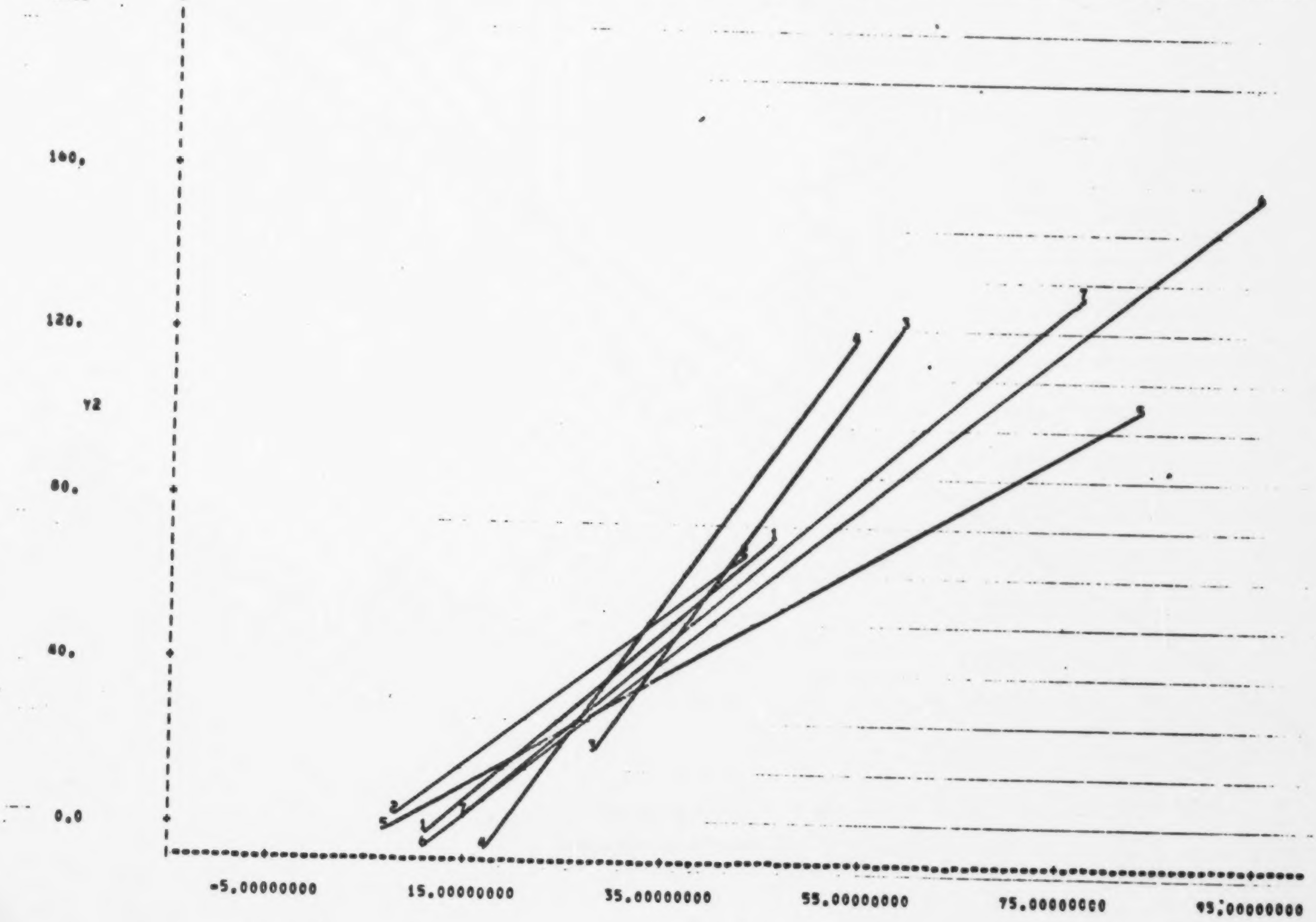


Figure C-27

METH1=TECH METH2=CHEM

PLOT OF Y2 VS Y1

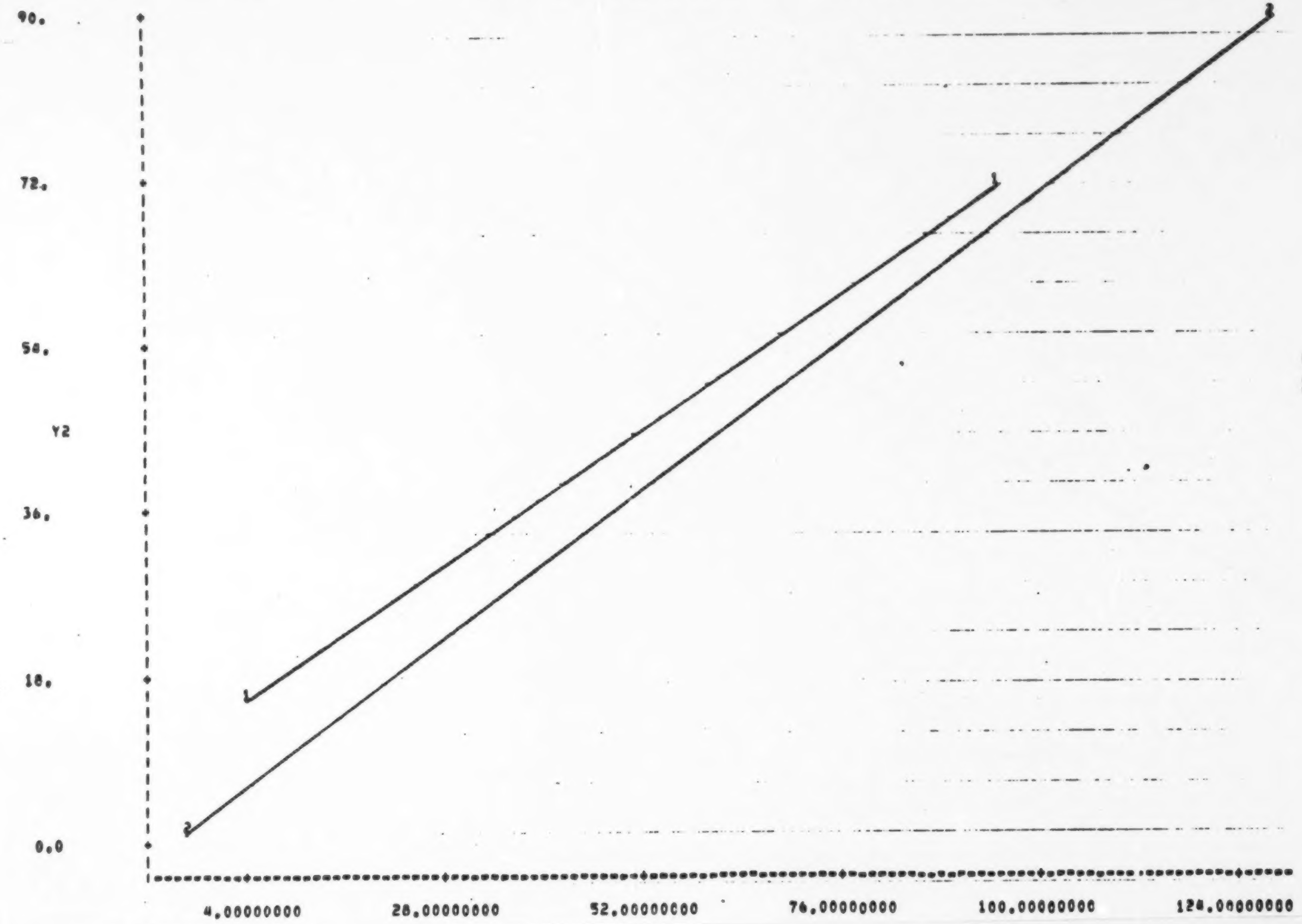


Figure C-28

METH1=TECH METH2=TECO

PLOT OF Y2 VS Y1

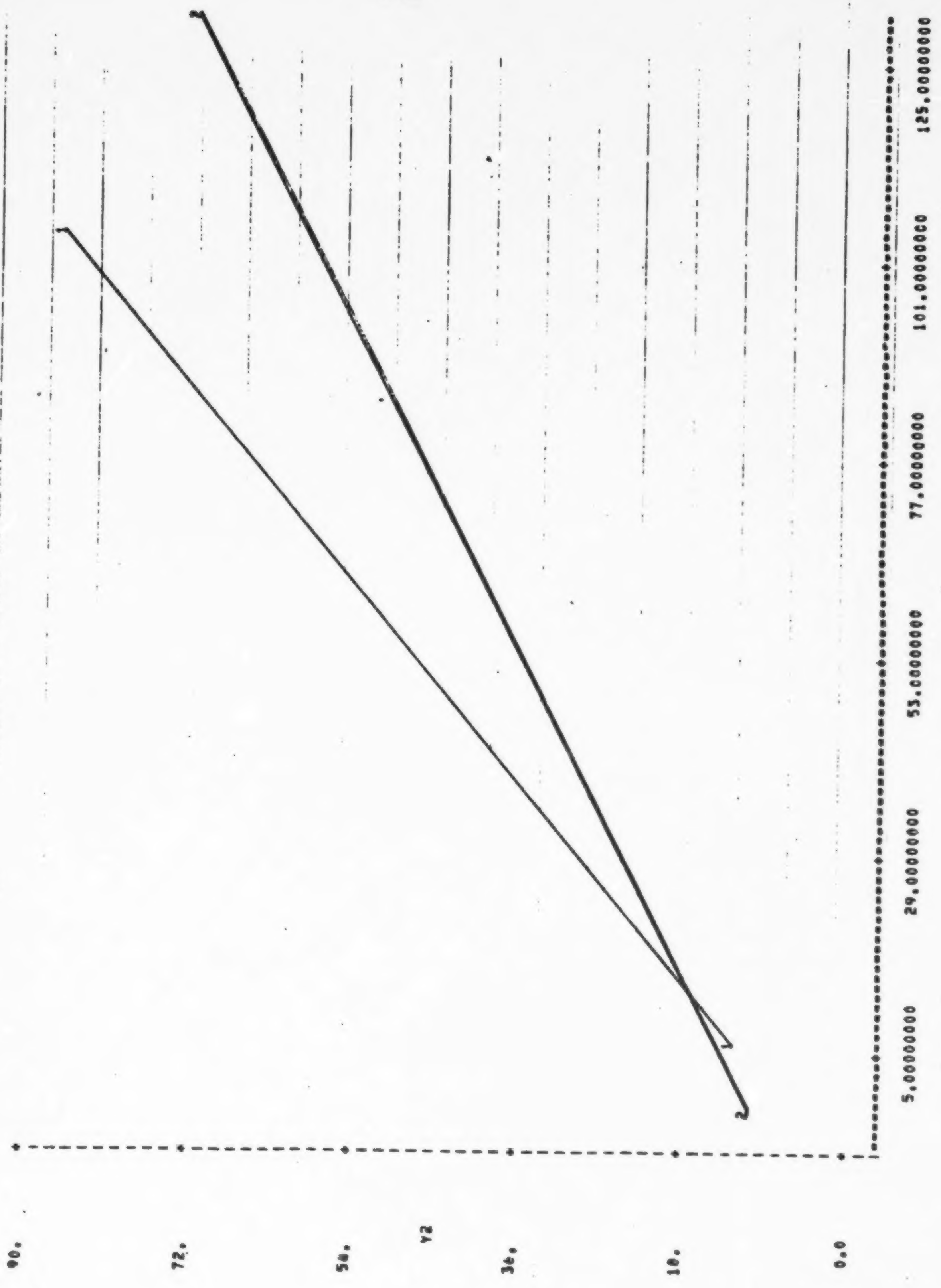


Figure C-29

METH1=TECH METH2=CHEM

PLOT OF Y2 VS Y1

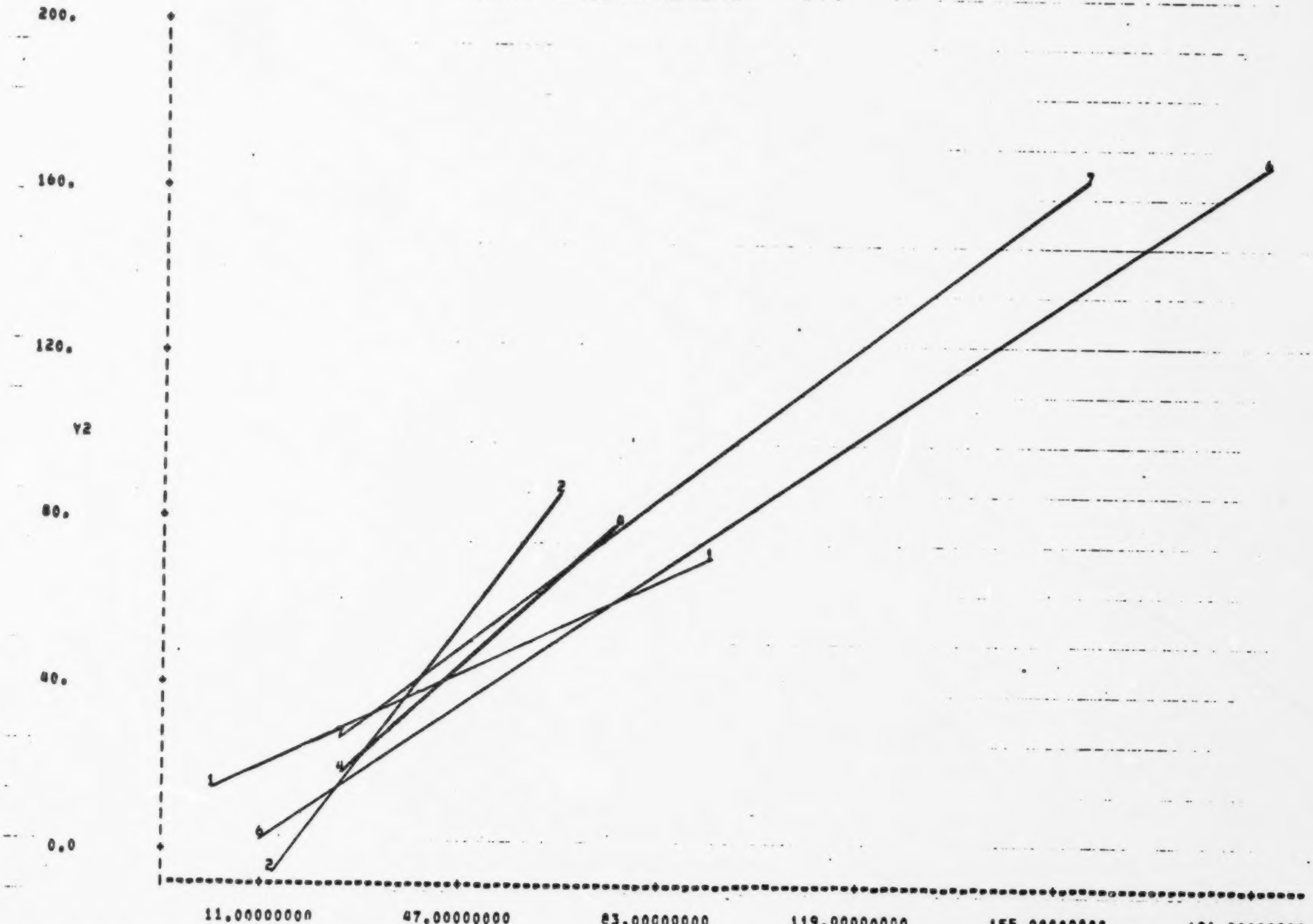
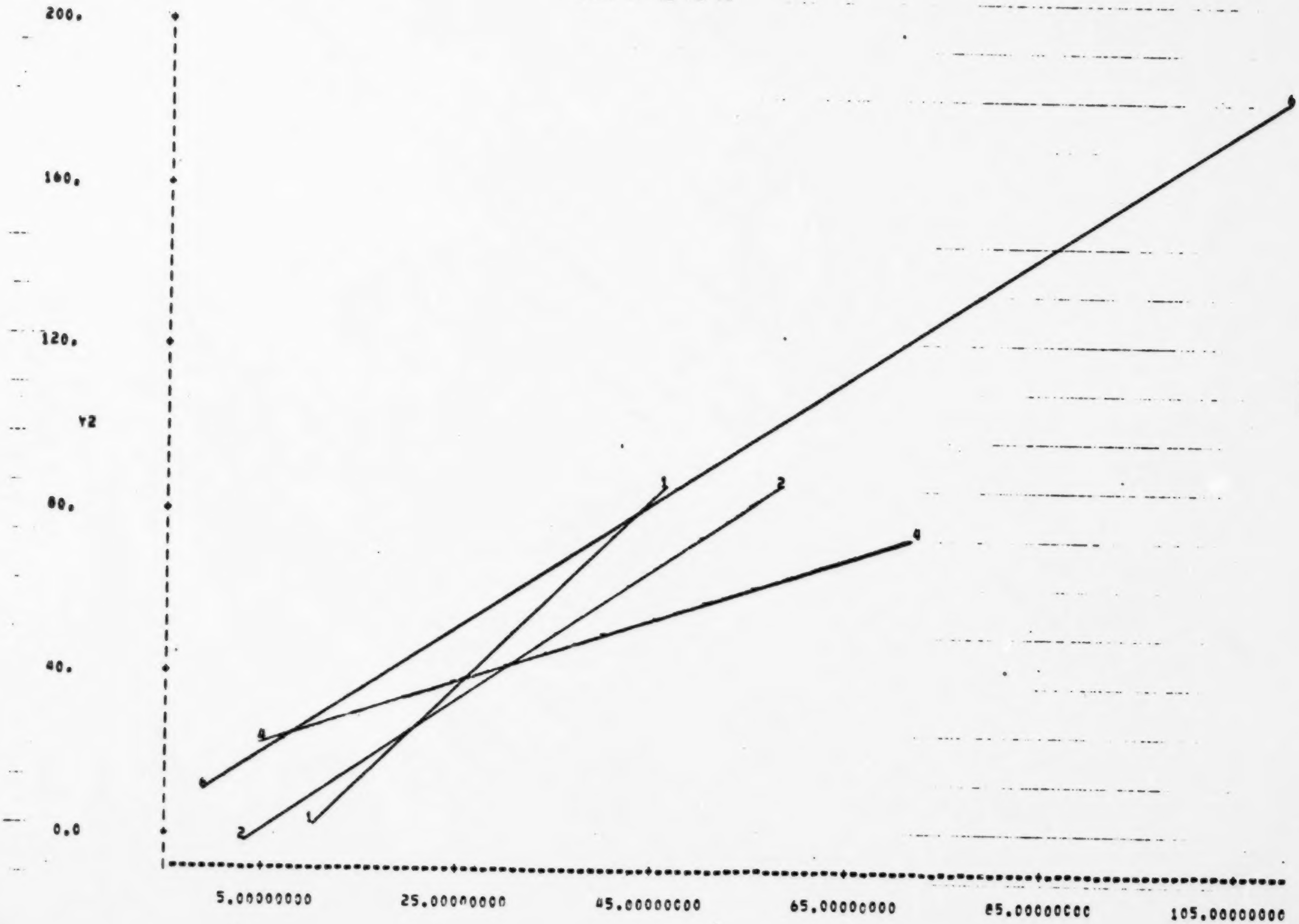


Figure C-30

METH1=TGSC METH2=CHEM

PLOT OF Y2 VS Y1



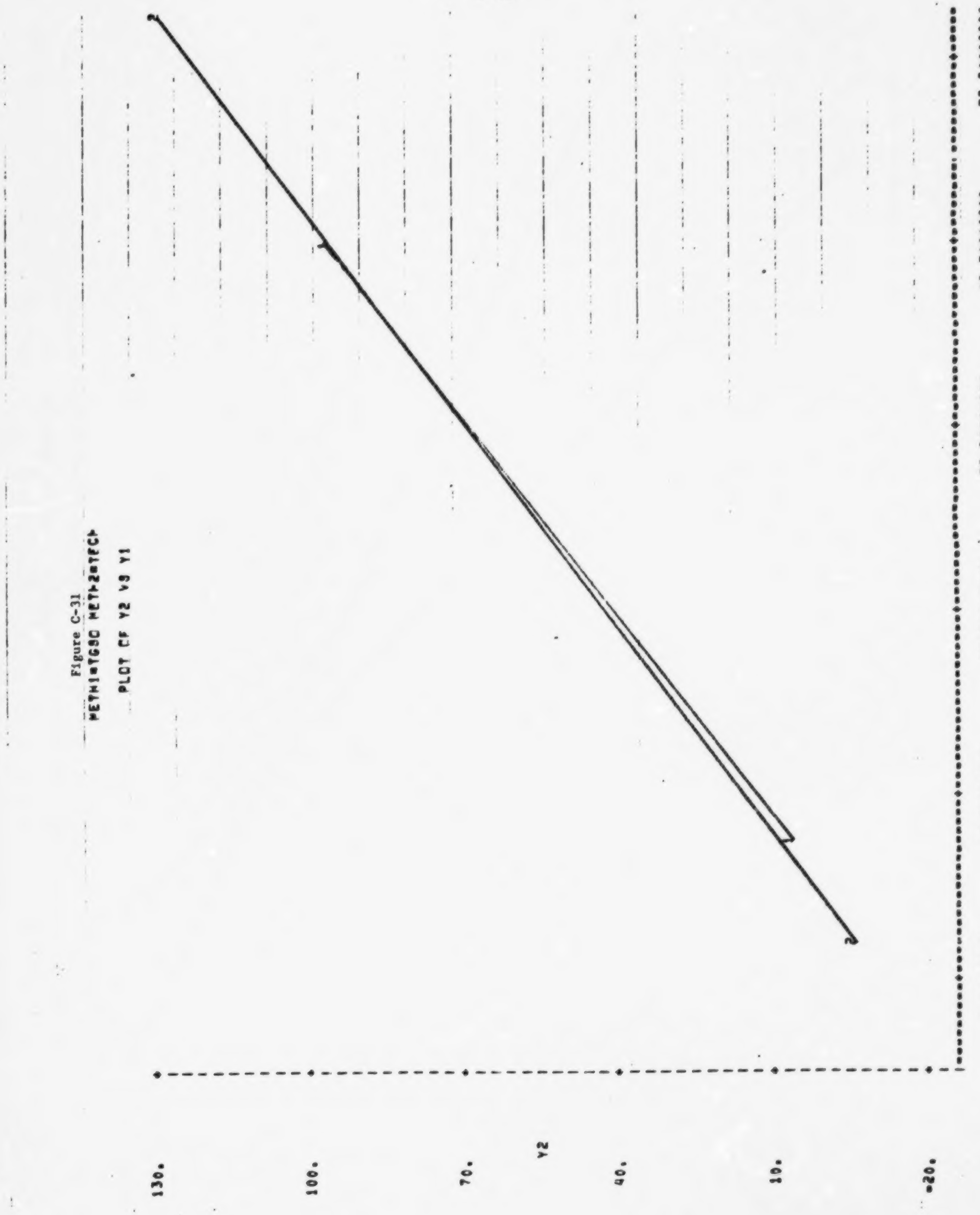


Figure C-31
METH1=TGSD METH2=TECH
PLOT OF Y2 VS Y1

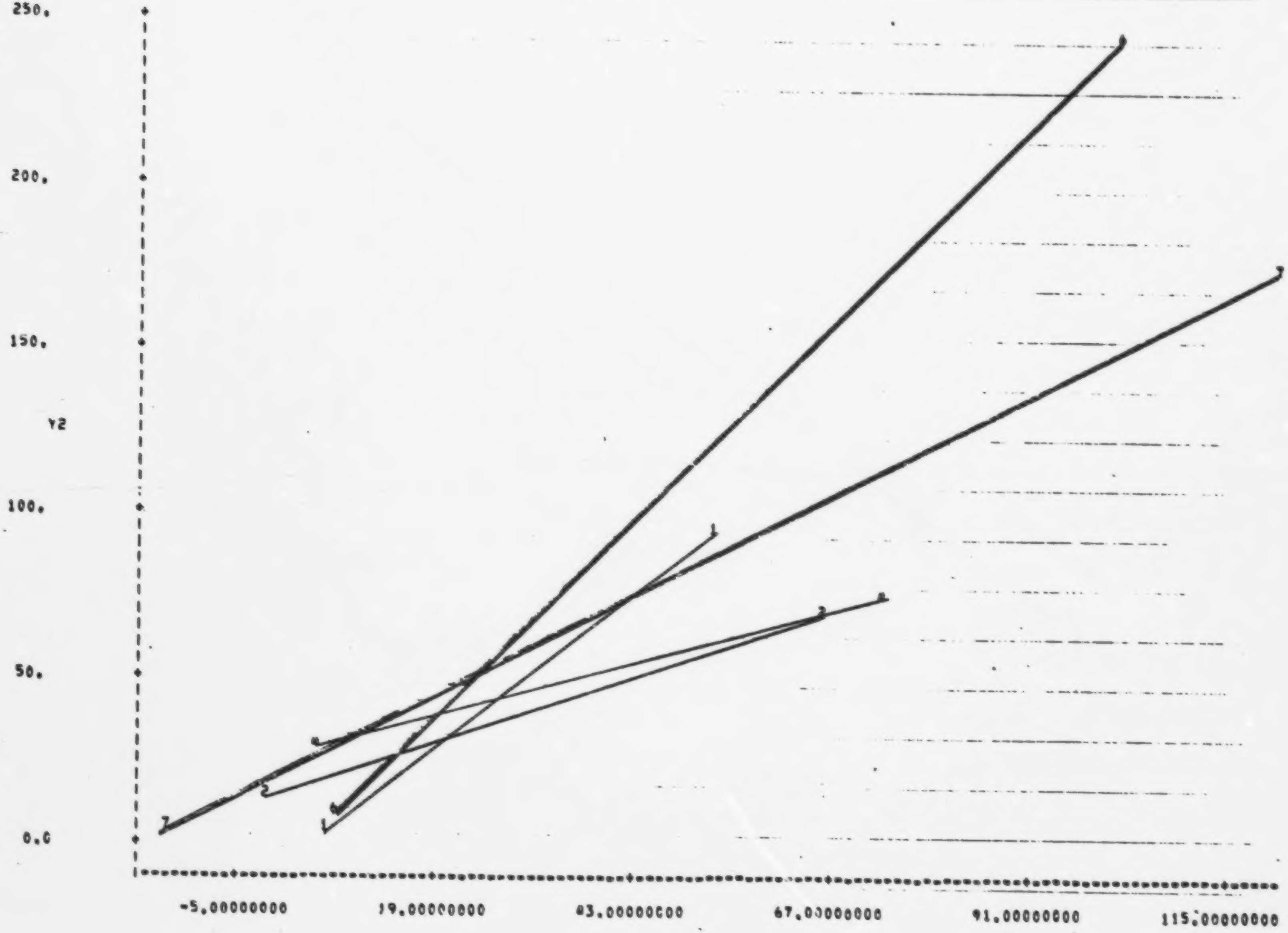


Figure C-32

METH1=TGSD METH2=TECA

PLOT OF Y2 VS Y1

Figure C-33

METH1=CHESSC METH2=CHEM

PLOT OF Y2 VS Y1

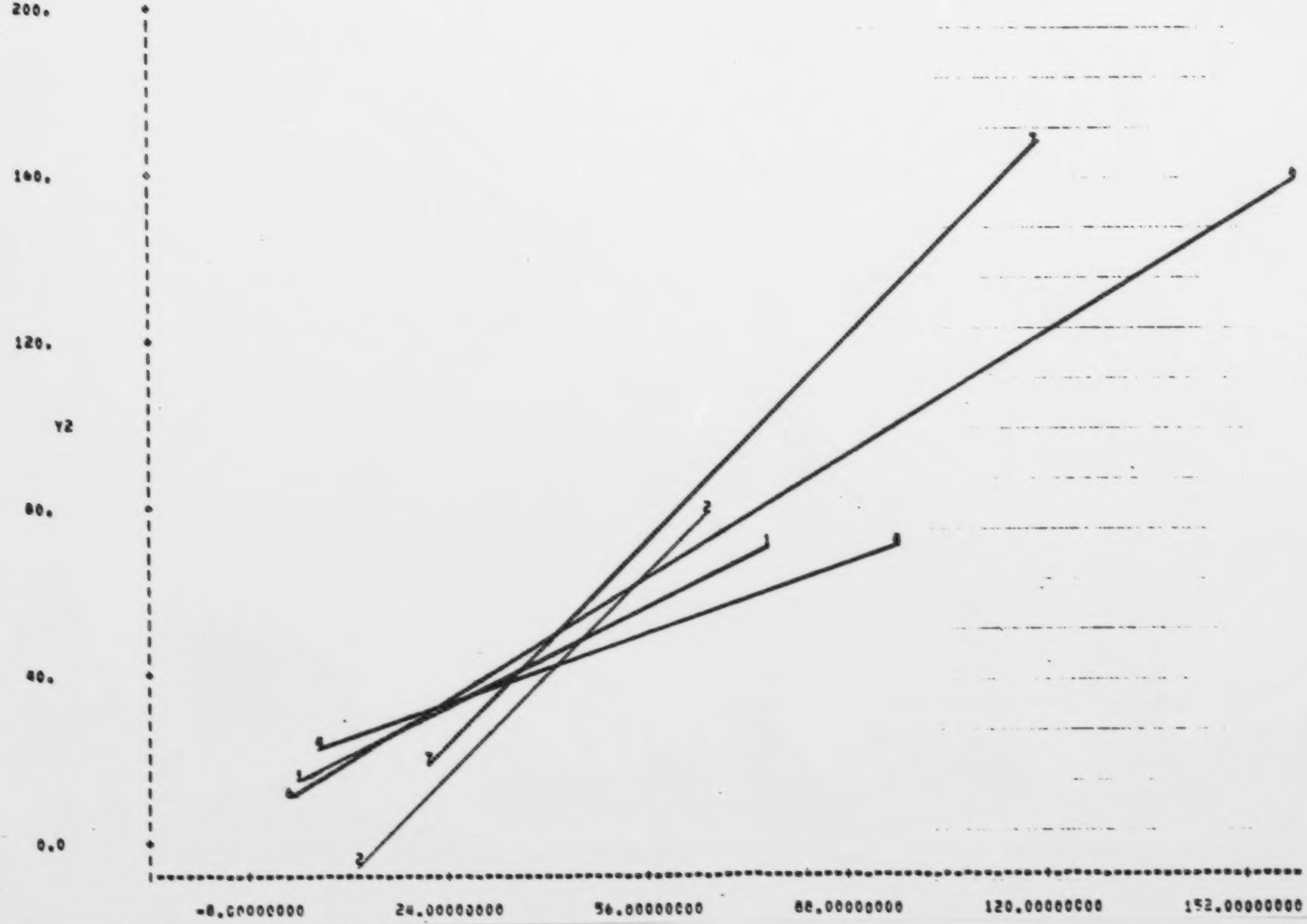
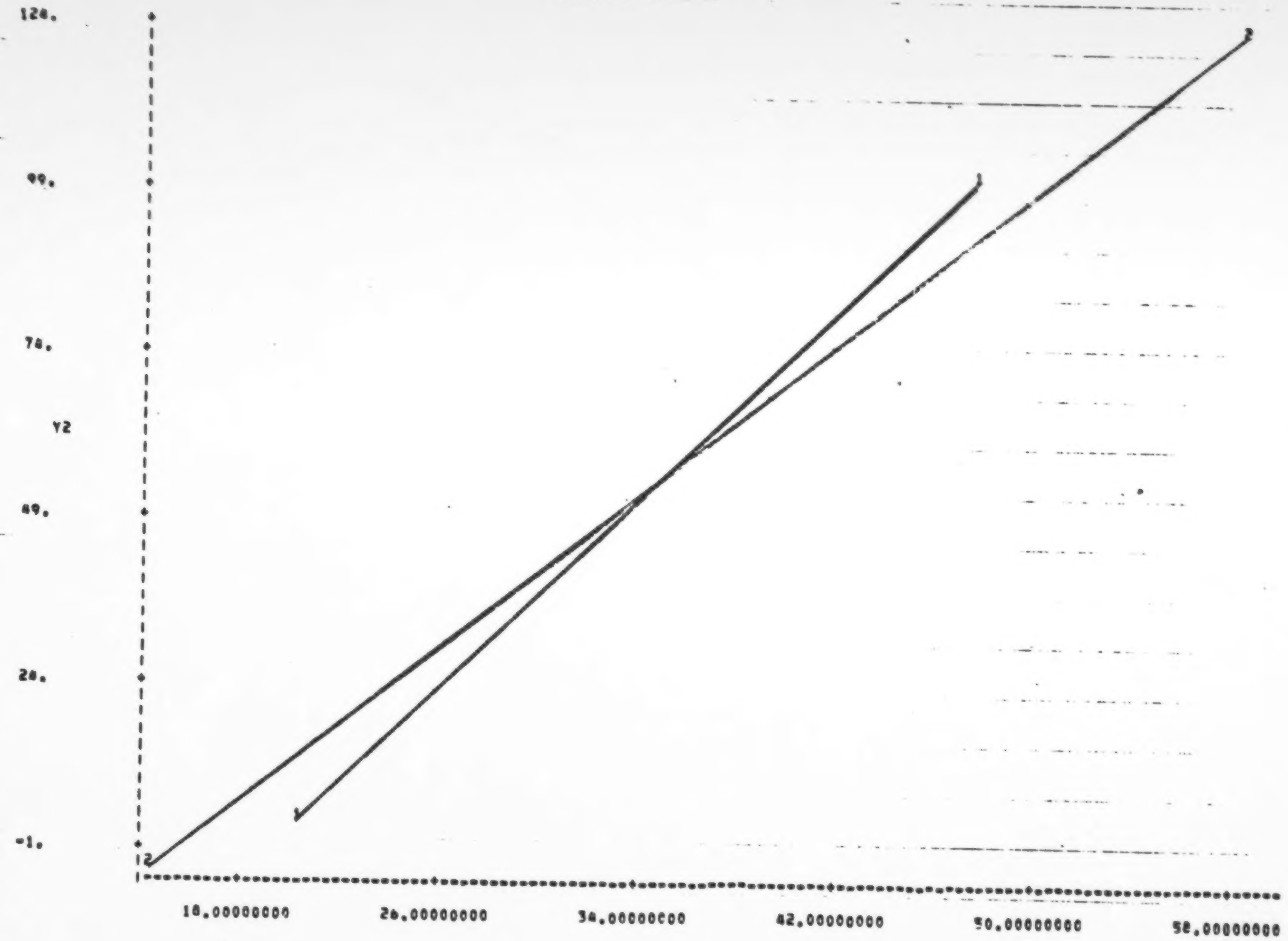


Figure C-34

METH1=CHESSC METH2=TECH

PLOT OF Y2 VS Y1



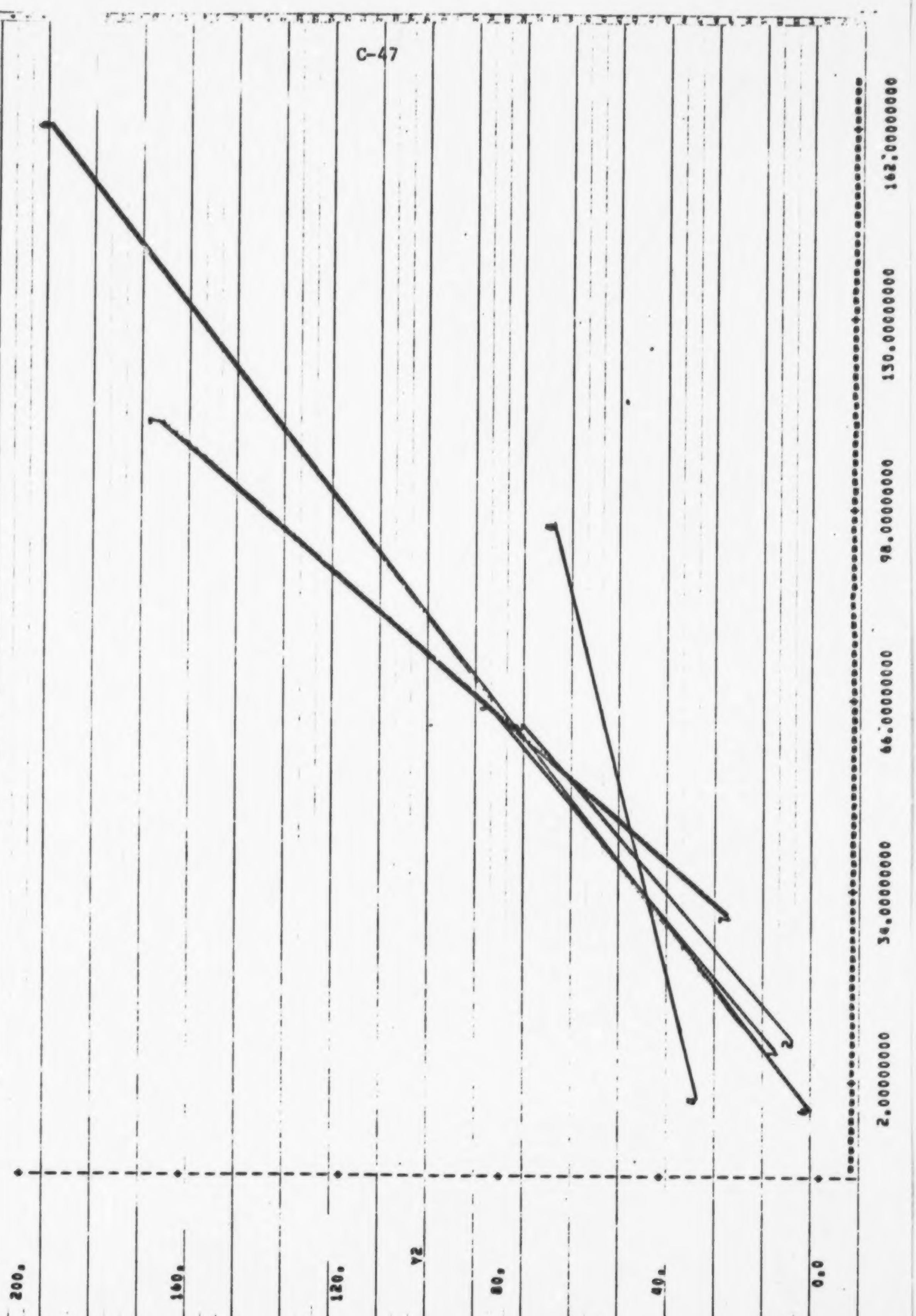


Figure C-35

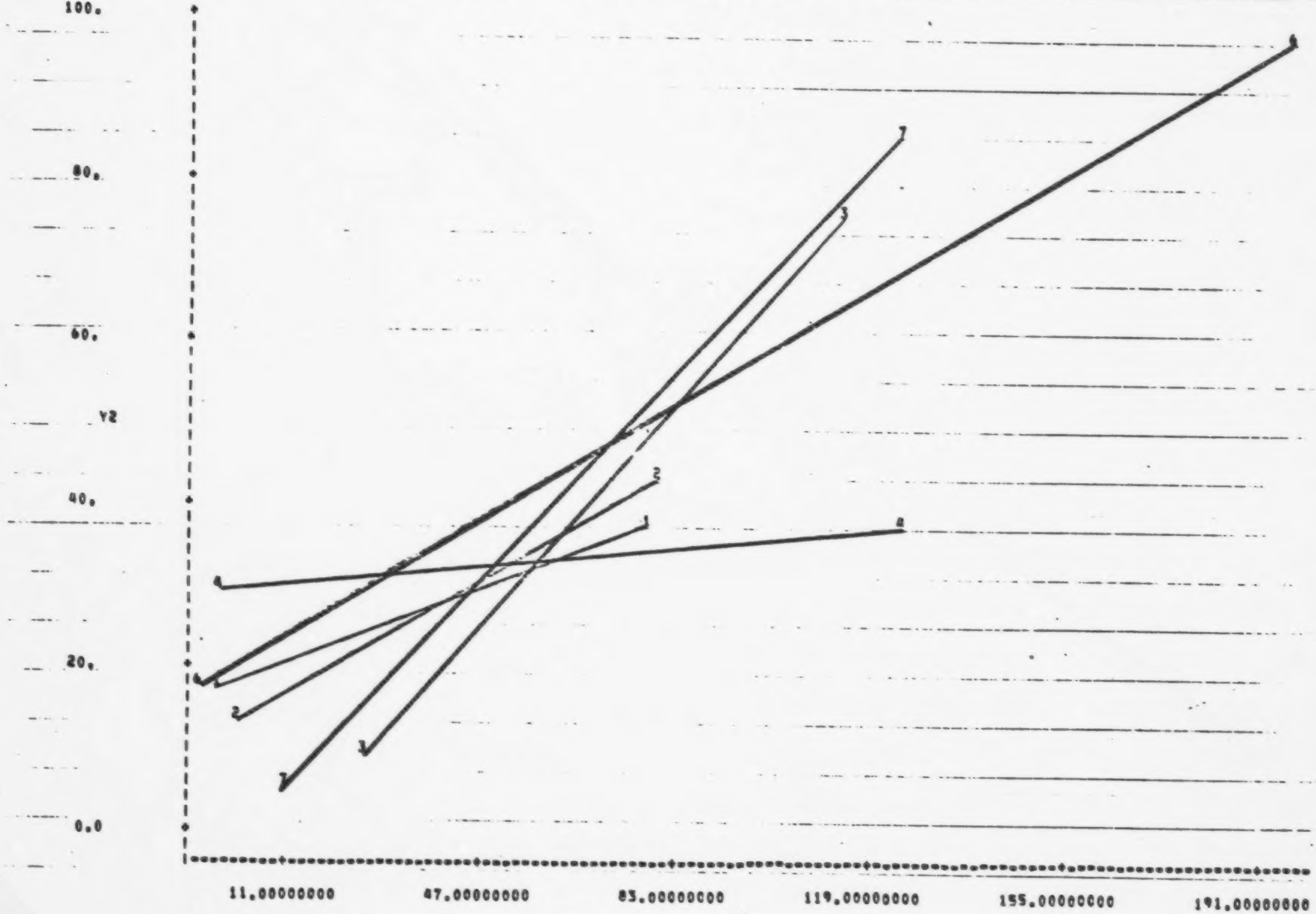
METH1=CHE8SC METH2=TEC4

PLOT OF Y2 VS Y1

Figure C-36

METH1=CHE80C METH2=TG80

PLOT OF Y2 VS Y1



## APPENDIX D. ALTERNATIVE PROCEDURES FOR DETERMINING RELATIONSHIPS BETWEEN MONITORING METHODS

Section 4.4.c presents the results of determining relationships between pairs of $NO_2$ monitoring methods as given in model (4.1) by using orthogonal regression. In this Appendix the results of using two alternative procedures to obtain these relationships are given; namely, (1) orthogonal regression using a model which is linear in the logarithms of the two methods, i.e.,

(D.1) $\log Y = A + B \log X$

and (2) ordinary regression assuming model (4.1) (i.e., linear on the untransformed data). In addition, this appendix also presents the procedure and statistics necessary to compute confidence limits on the ordinary regression lines.

The problems (i.e., failure of the underlying assumptions to hold) encountered when applying ordinary (least squares) regression analysis to determine functional relationships between two monitoring methods assuming model (4.1) have been discussed in Section 4.4.c. In essence the main problems are:

D-1. The monitoring data are such that the variance of $NO_2$ observations increases as the mean increases. (In ordinary regression it is assumed that the mean and variance of observations are independent.)

D-2. All the monitoring data are subject to error; therefore, when fitting regression relationships both variables are subject to error. (In ordinary regression the independent variable is assumed to be measured without error.)

D-3. In ordinary regression if monitoring method Y is used as the dependent variable and monitoring method X as the independent variable then the resulting estimated regression relationship between X and Y will be different than the estimated relationship obtained when X is treated as the dependent variable and Y as the independent variable.

To overcome the above problems RTI first transformed the original $NO_2$ data by taking logorithms of the data (to alleviate problem D-1) and then applied the orthogonal regression procedure (to alleviate problems D-2 and D-3) to model (D.1). This approach led to the estimated functional relationships between methods given in Table D-1. The notation used in the table is as follows:

(1) The first line of each set (pair of methods) represents the overall results obtained by combining the data from the seven sites (site 832D excluded).

(2) X corresponds to method 1 and Y to method 2 in model (D.1); hence,

N = number of paired observations
M1 = geometric mean for first method
M2 = geometric mean for second method
SD1 = standard deviation of logarithms for first method
SD2 = standard deviation of logarithms for second method
COR = correlation between X and Y on log scale

A and B are estimated from model (D.1) by using orthogonal regression; this model can also be expressed in $\mu g/m^3$ as $Y = e^A X^B$.

PCV1 = the percentage of variability accounted for by the first principal component (see equation 4.7)

RATIO = ratio of geometric means

(M1LOW, M1HIGH) = recommended range for method 1 over which the estimated relationship is applicable in μg/m$^3$, i.e., the recommended range using the model $Y = e^A X^B$

(M2LOW, M2HIGH) = same for method 2.

As mentioned in Section 4.4.c, RTI compared the orthogonal regression results in Table D-1 with those obtained in Appendix Table C-1 (orthogonal regression using the untransformed data). The comparisons were made by comparing corresponding plots of the estimated regression lines. These comparisons indicated that, over the range of the current $NO_2$ data, the two estimated relationships appeared to be quite similar; therefore, the untransformed results were used to describe the relationships between methods in Section 4.4.c. (see Table 4.13 or 5.3).

In addition to the two types of orthogonal regression, RTI also estimated the relationships between all pairs of monitoring methods X and Y by

(a) Using ordinary regression on untransformed data with Y as the dependent variable and X as the independent variable, and

(b) Using ordinary regression on untransformed data with X as the dependent variable and Y as the independent variable.

Table D-2 presents the results of using procedures (a) and (b) over sites. The table gives the following for a particular method as the dependent (Y) variable and another method as the independent (X) variable:

N = number of paired sample points,
CORR = correlation coefficient,
MEANX = the mean for method X,
STDX = the standard deviation for method X,
STDY-X = residual standard error from regression of Y on X,
A = estimated intercept for the model Y = A + BX (ordinary regression),
B = estimated slope for the model Y = A + BX (ordinary regression).

The table also gives the corresponding estimates of A and B using orthogonal regression (on the untransformed data) so that they can be compared with the ordinary regression estimates. To further illustrate the relationship between orthogonal and ordinary regression, Figure D-1 presents plots of three regressions (Y on X, X on Y and orthogonal) for one pair of methods (X = CHEM, Y = CHRO). The figure which also shows a scatter plot of the data used to fit the regressions, shows that the three regression procedures give noticeably different relationships between the CHEM and CHRO. The correlation coefficient between the two methods was .74. Of course, for two methods with a higher correlation coefficient, the three regression relationships would be closer together. For example, Figure D-2 of [10] shows that the corresponding three regressions for the CHRO and CHRF methods are very close to one another (the correlation between these two methods is .93).

If one uses estimated relationships obtained by ordinary regression (as in Table D-2) it must be kept in mind that these relationships are estimated when one or more of the underlying assumptions of regression are violated. The relationships do have intuitive appeal, if one wants to predict method Y from method X, since they involve a least squares fit to data. However, because of problems D-2 and D-3, RTI feels that the relationships given in Section 4.4.c are preferable to those given in Table D-2.

Because of the fact that EPA personnel expressed an interest in confidence limits on predicted $NO_2$ values the following paragraphs describe the procedures which can be used to compute confidence interval or prediction interval estimates. These procedures are based on the ordinary regression approach rather than the orthogonal regression. The failure of the independent variable X to be measured without error leads to a residual variance which overestimates the error variance. Hence the confidence (and prediction) interval estimates should tend to be conservative, i.e., a stated 95% interval estimate should actually have a higher confidence level. In other words, the interval estimates obtained will tend to be too wide.

Let $X_o$ be a particular fixed value for method X for which one desires a confidence interval (or a prediction interval) on method Y. A 95% confidence interval, for example, is an interval which has probability .95 of covering the true mean of method Y when method $X = X_o$. A 95% prediction interval is an interval which has probability .95 of covering a method Y reading when method $X = X_o$. A $(1-\alpha)$ 100% confidence interval is obtained using (D.2):

$$(D.2) \qquad A + BX_o \pm s_{Y \cdot X} t_{(1 - \frac{\alpha}{2}),\, N-2} \sqrt{\frac{1}{N} + \frac{(X_o - \overline{X})^2}{(N-1)s_X^2}} \,.$$

A (1-α) 100% prediction interval is obtained via (D.3):

$$(D.3) \qquad A + BX_o \pm s_{Y \cdot X} t_{(1 - \frac{\alpha}{2}),\, N-2} \sqrt{1 + \frac{1}{N} + \frac{(X_o - \overline{X})^2}{(N-1)s_X^2}}$$

The statistics used in (D.2) and (D.3) are all given in Table D-2. In particular, A and B are the estimated intercept and slope for the model $Y = A + BX$, $X_o$ is the fixed value for method X in μg/m$^3$, $\overline{X}$ is MEANX, $s_X$ is STDX and $s_{Y \cdot X}$ is STDY-X. The t values are extensively tabulated with $t_{(1 - \frac{\alpha}{2}),\, N-2} = (1 - \frac{\alpha}{2})$ 100 percentage point of the cumulative Student's-t distribution of N-2 degrees of freedom.

An illustration of the use of Table D-2 for computing confidence and prediction intervals is given below. Suppose we desire a 90% prediction interval for the CHRO(Y) readings when the CHEM(X) has a value ($X_o$) of 100 μg/m$^3$. Under the heading Y = CHRO, Table D-2 gives the following:

| | |
|---|---|
| $N = 650$ | $\overline{X} = 56.4$ |
| $A = 17.1376$ | $s_X = 34.54$ |
| $B = .485917$ | $s_{Y \cdot X} = 15.41$ |

The tabulated t value at .95 = $(1 - \frac{\alpha}{2})$ and N-2 = 648 degrees of freedom is 1.65. Hence, the 90% prediction limits are computed from (D.3) as follows:

$$17.1376 + 48.5917 \pm (15.41)(1.65)\sqrt{1 + \frac{1}{650} + \frac{(100 - 56.4)^2}{(649)(34.54)^2}}$$

$$65.7293 \pm (15.41)(1.65)(1.002)$$

$$65.73 \pm 25.48$$

Thus 40.3 and 91.2 represent the 90% prediction limits for the CHRO when the CHEM has a value of 100. The confidence interval is much narrower, of course.

All the results given in this appendix were obtained from the daily data after removing outliers. The results shown in this appendix are for descriptive purposes only. Their general use is not recommended (see Section 5.4).

Table D-1

ORTHOGONAL REGRESSION SUMMARY OF NO2 MONITORING METHODS, LOG SCALE

METH1=CHRF METH2=CHRC

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW[1/] | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 1326 | 42.5 | 41.4 | .5363 | .5252 | .903 | .049894 | 0.97704 | 95.1 | .964 | 15.1 | 122.3 | 14.9 | 115.1 |
| 632 | 219 | 31.3 | 31.2 | .4676 | .4587 | .805 | .078933 | 0.97840 | 96.3 | .998 | 12.8 | 76.2 | 13.1 | 74.4 |
| 633 | 225 | 30.2 | 29.1 | .4784 | .4648 | .647 | .078162 | 0.96847 | 92.4 | .965 | 14.0 | 75.9 | 11.9 | 70.9 |
| 831 | 49 | 47.2 | 45.6 | .4952 | .5047 | .915 | -.458336 | 1.10969 | 95.8 | .967 | 18.0 | 123.7 | 15.6 | 133.3 |
| 832 | 185 | 61.4 | 57.2 | .5042 | .5562 | .922 | -.531286 | 1.11219 | 96.2 | .933 | 22.9 | 164.2 | 19.2 | 171.1 |
| 832 D | 131 | 73.6 | 67.8 | .3772 | [illegible] | .656 | .026719 | 0.97620 | 92.9 | .929 | 35.2 | 151.2 | 33.3 | 138.0 |
| 841 | 175 | 50.9 | 50.7 | .5614 | .5469 | .858 | .266205 | 0.93115 | 92.9 | .996 | 16.5 | 157.1 | 17.8 | 104.8 |
| 901 | 236 | 55.5 | 52.1 | .3442 | .3247 | .906 | .187622 | 0.93766 | 95.3 | .939 | 26.3 | 108.9 | 27.7 | 98.1 |
| 902 | 237 | 40.7 | 39.1 | .4104 | .3895 | .917 | .164969 | 0.94452 | 95.9 | .960 | 18.2 | 91.1 | 18.3 | 83.6 |

METH1=CHRF METH2=TECH

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 268 | 29.0 | 50.1 | .4585 | .5206 | .631 | -.201107 | 1.22209 | 81.9 | 1.727 | 13.1 | 64.2 | 18.9 | 132.3 |
| 632 | 132 | 28.4 | 47.4 | .4395 | .4861 | .492 | -.244490 | 1.22617 | 75.0 | 1.669 | 13.8 | 58.1 | 19.6 | 114.1 |
| 633 | 136 | 29.6 | 52.8 | .4765 | .5482 | .740 | -.124118 | 1.20766 | 87.3 | 1.786 | 12.4 | 70.3 | 18.6 | 150. |

METH1=CHRF METH2=TEC4

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 655 | 40.2 | 52.4 | .5510 | .5876 | .693 | -0.09419 | 1.09719 | 84.7 | 1.303 | 14.8 | 109.3 | 17.5 | 156.9 |
| 632 | 104 | 31.2 | 40.8 | .4622 | .5059 | .485 | -0.48415 | 1.21861 | 73.1 | 1.307 | 14.8 | 65.6 | 16.5 | 106.9 |
| 633 | 158 | 30.0 | 36.6 | .4949 | .4799 | .497 | 0.40296 | 0.94016 | 74.9 | 1.221 | 12.6 | 71.6 | 16.2 | 83.0 |
| 831 | 17 | 51.3 | 77.2 | .2996 | .3496 | .608 | -0.41964 | 1.21009 | 90.7 | 1.503 | 29.4 | 89.7 | 39.3 | 151.7 |
| 832 | 129 | 61.0 | 87.2 | .4350 | .4632 | .546 | -0.51250 | 1.21165 | 77.6 | 1.430 | 29.4 | 126.4 | 36.0 | 210.9 |
| 832 D | 63 | 77.2 | 80.4 | .3871 | .5012 | .756 | -1.71417 | 1.40358 | 88.7 | 1.041 | 36.6 | 154.3 | 30.4 | 212.3 |
| 841 | 80 | 55.7 | 81.2 | .4857 | .4863 | .737 | 0.34695 | 1.00736 | 88.9 | 1.457 | 22.6 | 137.6 | 32.6 | 201.9 |
| 901 | 27 | 72.7 | 57.4 | .3530 | .4261 | .716 | -1.51498 | 1.24656 | 88.4 | 0.790 | 36.8 | 136.1 | 25.4 | 129.7 |
| 902 | 80 | 34.8 | 45.4 | .3734 | .3424 | .500 | 0.62958 | 0.89750 | 96.1 | 1.304 | 17.0 | 71.2 | 23.9 | 86.3 |

METH1=CHRF METH2=TGSL

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 650 | 42.1 | 33.0 | .4930 | .5809 | .805 | -1.08736 | 1.22516 | 90.6 | 0.783 | 16.8 | 105.4 | 10.7 | 101.4 |
| 632 | 108 | 31.6 | 24.9 | .4398 | .4842 | .620 | -0.79447 | 1.16755 | 81.[illegible] | 0.803 | 14.4 | 66.7 | 10.2 | 60.9 |
| 633 | 109 | 32.2 | 25.6 | .4001 | .5296 | .452 | -2.05979 | 1.52857 | 84.2 | 0.794 | 16.5 | 62.9 | 9.2 | 70.9 |
| 831 | 11 | 56.9 | 59.8 | .4076 | .5990 | .676 | -2.94496 | 1.74132 | 86.4 | 1.052 | 29.1 | 111.2 | 18.6 | 192.3 |
| 832 | 98 | 65.9 | 50.9 | .4896 | .4942 | .795 | -0.30628 | 1.01178 | 89.7 | 0.773 | 26.1 | 166.3 | 20.0 | 130.1 |
| 832 D | 75 | 78.1 | 58.6 | .4345 | .4365 | .826 | -0.31106 | 1.00560 | 91.3 | 0.751 | 34.1 | 179.1 | 25.4 | 135.1 |
| 841 | 88 | 45.4 | 36.1 | .6168 | .8025 | .889 | -1.54124 | 1.34330 | 94.9 | 0.794 | 14.0 | 147.4 | 7.4 | 175.3 |
| 901 | 122 | 46.8 | 37.5 | .2980 | .4242 | .784 | -2.44084 | 1.55975 | 80.6 | 0.766 | 20.7 | 83.2 | 16.3 | 86.1 |
| 902 | 114 | 38.8 | 28.9 | .2758 | .3776 | .711 | -2.26379 | 1.52262 | 87.[illegible] | 0.746 | 24.0 | 62.7 | 13.9 | 60.2 |

Table D-1 Continued

REGRESSION SUMMARY OF NO2 MONITORING METHODS, LOG SCALE

METH1=CHRF METH2=CHESSC

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 1184 | 42.5 | 46.3 | .5242 | .6092 | .646 | -0.89001 | 1.26072 | 82.5 | 1.091 | 17.1 | 105.3 | 16.7 | 165.7 |
| 632 | 210 | 31.8 | 30.0 | .4840 | .5236 | .477 | -1.21982 | 1.20721 | 74.4 | 0.967 | 14.8 | 65.0 | 11.6 | 77.8 |
| 633 | 203 | 29.7 | 30.5 | .4785 | [illegible] | .452 | -0.06947 | 1.03684 | 72.5 | 1.027 | 13.2 | 66.5 | 13.2 | 70.3 |
| 831 | 53 | 49.4 | 45.5 | .5111 | [illegible] | .685 | -1.75815 | 1.43953 | 85.4 | 0.920 | 20.5 | 119.0 | 12.8 | [illegible] |
| 832 | 186 | 56.8 | 67.1 | .4615 | .5431 | .603 | -1.11978 | 1.30720 | 80.8 | 1.141 | 27.0 | 128.1 | 24.2 | [illegible] |
| 832 D | 123 | 74.9 | 76.3 | .3837 | .5279 | .517 | -3.55572 | 1.82830 | 76.6 | 1.019 | 43.0 | 130.9 | 27.6 | 211.6 |
| 841 | 154 | 50.9 | 58.7 | .4986 | .4869 | .586 | 0.24893 | 0.96042 | 79.3 | 1.154 | 20.8 | 124.6 | 24.9 | 138.8 |
| 901 | 191 | 55.5 | 65.4 | .3390 | .3968 | .411 | -1.74006 | 1.47383 | 71.8 | 1.177 | 33.9 | 91.4 | 31.4 | 136.2 |
| 902 | 187 | 40.5 | 48.0 | .4261 | .5553 | .464 | -2.53806 | 1.73195 | 75.7 | 1.186 | 22.0 | 73.5 | 16.7 | 138.0 |

METH1=CHRC METH2=CHEM

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 650 | 39.5 | 46.9 | .4945 | .5372 | .681 | -1.45211 | 1.44442 | 85.2 | 1.187 | 16.9 | 92.2 | 13.8 | 155.6 |
| 632 | 164 | 33.9 | 37.5 | .4151 | .5255 | .468 | -2.12000 | 1.63112 | 75.5 | 1.108 | 18.4 | 62.2 | 13.9 | 101.4 |
| 633 | 171 | 31.3 | 31.2 | .4259 | .6054 | .505 | -3.23969 | 1.94051 | 79.2 | 0.998 | 17.1 | 57.2 | 9.7 | 100.7 |
| 831 | 12 | 51.0 | 54.2 | .3701 | .4921 | .816 | -1.57136 | 1.41496 | 91.6 | 1.062 | 25.8 | 100.7 | 20.7 | 141.9 |
| 832 | 102 | 54.2 | 71.1 | .5017 | .5285 | .946 | -0.06263 | 1.08367 | 82.4 | 1.312 | 22.1 | 132.9 | 26.9 | 187.9 |
| 832 D | 57 | 70.0 | 82.8 | .3700 | .5830 | .646 | -3.93732 | 1.96636 | 86.1 | 1.183 | 39.2 | 125.1 | 26.4 | 259.8 |
| 841 | 76 | 54.0 | 84.3 | .5034 | .4964 | .745 | 0.51987 | 0.96135 | 87.3 | 1.561 | 21.0 | 138.5 | 33.4 | 212.5 |
| 901 | 43 | 60.1 | 75.8 | .3448 | .2895 | .761 | 1.43121 | 0.76062 | 86.5 | 1.262 | 30.6 | [illegible] | 44.8 | 126.2 |
| 902 | 82 | 34.3 | 45.2 | .3178 | .4010 | .579 | -1.43063 | 1.48357 | 80.4 | 1.321 | 20.5 | 57.2 | 21.1 | 96.8 |

METH1=CHRC METH2=TECH

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 270 | 29.4 | 49.9 | .4540 | .5187 | .609 | -.218636 | 1.22188 | 80.8 | 1.701 | 13.3 | 64.6 | 19.0 | 130.9 |
| 632 | 134 | 29.3 | 47.4 | .4482 | .4774 | .457 | -.017207 | 1.14765 | 73.0 | 1.618 | 14.0 | 61.0 | 20.4 | 110.1 |
| 633 | 136 | 29.4 | 52.6 | .4705 | .5531 | .736 | -.246738 | 1.24451 | 87.2 | 1.787 | 12.6 | 68.8 | 18.3 | 151.4 |

METH1=CHRC METH2=TEC4

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 643 | 38.6 | 52.0 | .5169 | .5886 | .722 | -0.42033 | 1.19639 | 86.4 | 1.346 | 15.2 | 98.3 | 17.0 | 152.9 |
| 632 | 170 | 31.4 | 41.1 | .4360 | .5037 | .551 | -0.75280 | 1.29708 | 78.2 | 1.311 | 15.3 | 64.4 | 16.2 | 104.8 |
| 633 | 160 | 29.6 | 36.5 | .4676 | .4853 | .545 | -0.02856 | 1.07040 | 77.3 | 1.234 | 13.2 | 66.4 | 15.4 | 86.7 |
| 831 | 18 | 49.6 | 77.0 | .2686 | .3337 | .809 | -0.75529 | 1.30625 | 90.9 | 1.553 | 30.2 | 81.4 | 40.2 | 147.3 |
| 832 | 116 | 56.2 | 66.6 | .4580 | .4904 | .802 | -0.75198 | 1.12036 | 80.2 | 1.542 | 25.2 | 125.1 | 35.3 | 212.5 |
| 832 D | 60 | 69.9 | 77.1 | .3678 | .4892 | .725 | -1.31962 | 1.47514 | 87.5 | 1.103 | 36.8 | 132.9 | 29.9 | 198.9 |
| 841 | 75 | 56.1 | 85.4 | .4108 | .4759 | .686 | -0.53679 | 1.23780 | 94.7 | 1.523 | 27.1 | 118.0 | 34.7 | 210.0 |
| 901 | 26 | 62.2 | 58.5 | .3536 | .4310 | .765 | -1.27506 | 1.29370 | 88.9 | 0.940 | 32.7 | 118.3 | [illegible] | 134.4 |
| 902 | 78 | 33.8 | 45.7 | .3630 | .3428 | .801 | 0.54300 | 0.93099 | 90.1 | 1.350 | 16.9 | 67.7 | 23.9 | 87.1 |

Table D-1 Continued

REGRESSION SUMMARY OF NO2 MONITORING METHODS, LOG SCALE

METH1=CHRC METH2=TGSU

| SITE | | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 633 | 41.7 | 32.6 | .4706 | .5742 | .767 | -1.33710 | 1.29402 | 86.9 | 0.786 | 17.7 | 98.1 | 10.8 | 99.3 |
| 632 | | 111 | 32.3 | 24.0 | .4080 | .5108 | .620 | -1.79202 | 1.42984 | 82.2 | 0.742 | 16.4 | 63.7 | 9.1 | 65.5 |
| 633 | | 109 | 32.9 | 25.6 | .3860 | .5297 | .614 | -2.53668 | 1.65380 | 83.0 | 0.777 | 17.7 | 61.1 | 9.2 | 71.1 |
| 831 | | 8 | 49.9 | 54.2 | .5114 | .6651 | .427 | -1.10655 | 1.32712 | 96.6 | 1.189 | 18.5 | 134.5 | 15.9 | 221.1 |
| 832 | | 91 | 63.5 | 51.5 | .4818 | .4870 | .794 | -0.26608 | 1.01365 | 89.7 | 0.811 | 25.5 | 158.0 | 20.4 | 129.8 |
| 832 | D | 69 | 72.8 | 57.8 | .4433 | .4605 | .778 | -0.44758 | 1.05029 | 88.9 | 0.793 | 31.7 | 167.3 | 24.1 | 134.5 |
| 841 | | 81 | 46.9 | 30.2 | .5965 | .7239 | .761 | -1.31605 | 1.28816 | 86.6 | 0.613 | 15.9 | 138.6 | 9.5 | 153.9 |
| 901 | | 120 | 47.3 | 37.6 | .2953 | .4261 | .730 | -2.68842 | 1.63748 | 88.4 | 0.795 | 26.5 | 78.7 | 16.4 | 89.5 |
| 902 | | 113 | 36.1 | 29.3 | .3086 | .3901 | .675 | -1.75361 | 1.41017 | 84.8 | 0.770 | 22.4 | 64.7 | 13.9 | 61.9 |

METH1=CHRC METH2=CHESSC

| SITE | | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 1169 | 40.6 | 46.0 | .5139 | .6032 | .607 | -0.99394 | 1.30003 | 81.0 | 1.126 | 17.1 | 97.4 | 14.9 | 142.4 |
| 632 | | 216 | 31.2 | 30.1 | .4573 | .5156 | .414 | -1.17825 | 1.33225 | 71.4 | 0.966 | 15.5 | 62.8 | 11.9 | 76.5 |
| 633 | | 206 | 26.6 | 30.5 | .4726 | .4832 | .440 | -0.11803 | 1.05167 | 72.0 | 1.057 | 13.1 | 63.6 | 13.3 | 70.0 |
| 831 | | 51 | 44.7 | 45.9 | .5623 | .6429 | .693 | -0.78220 | 1.21254 | 85.0 | 1.026 | 16.4 | 121.9 | 13.6 | 154.7 |
| 832 | | 166 | 55.6 | 67.0 | .4741 | .5189 | .560 | -0.51467 | 1.17447 | 78.2 | 1.205 | 24.8 | 124.4 | 28.0 | 172.6 |
| 832 | D | 113 | 66.6 | 74.4 | .3499 | .5467 | .462 | -5.82850 | 2.41261 | 79.6 | 1.113 | 42.9 | 104.1 | 25.5 | 210.9 |
| 841 | | 152 | 50.6 | 58.2 | .5064 | .4878 | .469 | 0.43565 | 0.92359 | 73.5 | 1.145 | 21.0 | 123.3 | 25.7 | 131.9 |
| 901 | | 193 | 52.4 | 65.4 | .3177 | .4009 | .365 | -3.07126 | 1.83159 | 71.1 | 1.247 | 34.7 | 79.2 | 30.7 | 139.4 |
| 902 | | 185 | 39.6 | 48.6 | .4076 | .5625 | .445 | -3.37293 | 1.97767 | 76.3 | 1.240 | 22.7 | 67.8 | 16.5 | 143.6 |

METH1=FRMF METH2=CHEM

| SITE | | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 688 | 64.0 | 46.9 | .4946 | .6829 | .644 | -2.3617 | 1.49340 | 83.7 | 0.734 | 28.0 | 148.1 | 13.7 | 161.1 |
| 632 | | 155 | 55.0 | 37.2 | .4436 | .5366 | .611 | -1.8400 | 1.36115 | 81.4 | 0.675 | 26.1 | 115.8 | 13.5 | 102.5 |
| 633 | | 174 | 50.9 | 31.1 | .4450 | .5975 | .430 | -4.0871 | 1.91441 | 75.1 | 0.610 | 28.0 | 92.5 | 9.9 | 97.5 |
| 831 | | 14 | 65.4 | 54.9 | .4054 | .4621 | .066 | -13.0044 | 4.21245 | 57.3 | 0.839 | 52.7 | 81.1 | 22.2 | 135.7 |
| 832 | | 102 | 98.5 | 74.3 | .5454 | .5622 | .624 | -0.5037 | 1.04843 | 81.2 | 0.755 | 37.2 | 261.1 | 26.7 | 206.0 |
| 832 | D | 54 | 108.0 | 87.3 | .4106 | .6097 | .517 | -5.1162 | 2.05527 | 80.5 | 0.823 | 59.6 | 188.8 | 26.7 | 285.0 |
| 841 | | 79 | 73.4 | 80.5 | .4076 | .4889 | .643 | -1.2998 | 1.32419 | 82.9 | 1.098 | 36.5 | 147.6 | 31.9 | 203.1 |
| 901 | | 43 | 88.8 | 73.7 | .2814 | .2971 | .753 | -0.9203 | 1.07506 | 87.7 | 0.832 | 52.8 | 149.3 | 42.1 | 129.2 |
| 902 | | 81 | 59.6 | 45.3 | .3071 | .3967 | .408 | -3.6131 | 1.81064 | 73.4 | 0.760 | 39.4 | 90.3 | 21.3 | 96.2 |

Table D-1 Continued

REGRESSION SUMMARY OF NO2 MONITORING METHODS, LOG SCALE

METH1=FRMF METH2=CHPP

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 1337 | 67.4 | 43.0 | .5274 | .5321 | .777 | -0.49819 | 1.01137 | 88.9 | .537 | 25.0 | 182.6 | 15.7 | 117.3 |
| 632 | 211 | 51.1 | 31.3 | .4587 | .4464 | .684 | -0.33628 | 0.96097 | 84.2 | .613 | 21.9 | 119.2 | 13.9 | 70.7 |
| 633 | 227 | 47.7 | 30.2 | .4992 | .4741 | .635 | -0.15724 | 0.92216 | 81.8 | .633 | 19.1 | 119.1 | 13.0 | 70.2 |
| 831 | 50 | 61.4 | 50.2 | .6410 | .5128 | .786 | 0.81178 | 0.75394 | 89.9 | .818 | 17.7 | 212.9 | 19.7 | [illegible] |
| 832 | 191 | 100.9 | 61.5 | .5297 | .5016 | .746 | -0.17101 | 0.92971 | 87.3 | .609 | 37.2 | 273.9 | 24.3 | [illegible] |
| 832 D | 131 | 100.8 | 71.6 | .4307 | .4444 | .684 | -0.55831 | 1.04700 | 84.2 | .711 | 46.0 | 220.9 | 31.5 | 162.9 |
| 841 | 164 | 69.2 | 49.4 | .5220 | .5892 | .786 | -1.04205 | 1.16644 | 89.5 | .714 | 26.2 | 182.3 | 15.9 | 152.9 |
| 901 | 237 | 66.1 | 54.7 | .2960 | .3390 | .728 | -1.36302 | 1.20408 | 86.7 | .639 | 50.4 | 147.0 | 20.7 | 104.2 |
| 902 | 237 | 68.1 | 40.9 | .3798 | .4079 | .718 | -0.95441 | 1.10541 | 89.6 | .601 | 34.1 | 136.1 | 19.1 | 88.0 |

METH1=FRMF METH2=CHRC

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 1313 | 67.0 | 41.3 | .5210 | .5242 | .782 | -0.53823 | 1.01284 | 89.1 | .616 | 25.1 | 178.8 | 15.3 | [illegible] |
| 632 | 218 | 50.5 | 30.4 | .4662 | .4580 | .682 | -0.39065 | 0.97433 | 84.1 | .612 | 21.4 | 119.2 | 13.4 | 71.3 |
| 633 | 228 | 47.3 | 29.1 | .4993 | .4650 | .702 | -0.11394 | 0.90345 | 85.2 | .619 | 18.6 | 120.4 | 12.5 | 67.6 |
| 831 | 47 | 60.9 | 45.2 | .6461 | .5510 | .672 | 0.56621 | 0.79004 | 84.1 | .743 | 17.9 | 206.8 | 17.2 | 118.8 |
| 832 | 171 | 101.4 | 56.1 | .5170 | .5599 | .708 | -1.10722 | 1.11887 | 85.5 | .572 | 39.7 | 259.8 | 20.3 | 164.1 |
| 832 D | 122 | 102.4 | 67.6 | .3422 | .3747 | .635 | -0.09389 | 0.93074 | 81.8 | .661 | 49.9 | 210.0 | 34.7 | 132.0 |
| 841 | 176 | 72.1 | 51.0 | .4840 | .5496 | .807 | -1.07819 | 1.17084 | 90.5 | .707 | 29.2 | 176.3 | 17.7 | 147.1 |
| 901 | 235 | 66.2 | 51.8 | .2957 | .3213 | .733 | -1.04517 | 1.12009 | 86.8 | .601 | 50.2 | 148.2 | 28.2 | 95.0 |
| 902 | 238 | 67.6 | 39.5 | .3666 | .3904 | .746 | -0.90575 | 1.08756 | 87.4 | .589 | 34.4 | 133.2 | 18.9 | 82.8 |

METH1=FRMF METH2=TEAF

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 1290 | 66.5 | 33.1 | .5173 | .5517 | .807 | -1.04839 | 1.08318 | 90.4 | .497 | 25.1 | 176.4 | 11.5 | 95.1 |
| 632 | 214 | 51.0 | 25.3 | .4655 | .4638 | .803 | -0.69476 | 0.99609 | 90.2 | .495 | 21.1 | 123.4 | 10.5 | 61.1 |
| 633 | 227 | 47.2 | 22.2 | .4976 | .5250 | .722 | -1.05105 | 1.07716 | 86.1 | .471 | 18.9 | 117.8 | 8.3 | 57.5 |
| 831 | 48 | 59.9 | 40.3 | .6306 | .5050 | .766 | 0.62948 | 0.74964 | 89.0 | .674 | 17.7 | 202.8 | 16.2 | 100.6 |
| 832 | 159 | 99.9 | 47.9 | .5102 | .5233 | .760 | -1.62072 | 1.19236 | 88.2 | .480 | 39.2 | 254.7 | 15.7 | 146.2 |
| 832 D | 115 | 101.4 | 57.2 | .4067 | .5034 | .745 | -2.09161 | 1.32879 | 87.9 | .564 | 48.9 | 210.3 | 21.7 | 150.7 |
| 841 | 168 | 70.7 | 39.2 | .4971 | .6202 | .779 | -1.97938 | 1.32657 | 89.5 | .555 | 28.6 | 174.8 | 11.8 | 130.4 |
| 901 | 239 | 85.6 | 40.6 | .2935 | .3433 | .733 | -1.80293 | 1.23746 | 87.0 | .474 | 50.4 | 145.4 | 21.1 | 78.2 |
| 902 | 235 | 67.9 | 33.2 | .3781 | .3916 | .794 | -0.90572 | 1.04530 | 89.7 | .489 | 33.3 | 136.5 | 15.6 | 70.0 |

METH1=FRMF METH2=TECH

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 265 | 50.4 | 49.6 | .4686 | .5207 | .539 | -0.85981 | 1.21513 | 77.3 | 0.984 | 23.0 | 110.2 | 19.2 | 128.3 |
| 632 | 128 | 50.7 | 46.6 | .4231 | .4893 | .434 | -1.61822 | 1.39089 | 72.6 | 0.920 | 26.6 | 96.5 | 17.1 | 114.2 |
| 633 | 137 | 50.1 | 52.5 | .5085 | .5436 | .620 | -0.39868 | 1.11364 | 81.1 | 1.047 | 20.5 | 122.8 | 19.4 | 142.3 |

Table D-1 Continued

REGRESSION SUMMARY OF NO2 MONITORING METHODS, LOG SCALE

METH1=FRMF METH2=TEC4

| SITE | | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 637 | 63.5 | 51.9 | .5266 | .5939 | .691 | -0.98807 | 1.18973 | 84.8 | 0.818 | 24.8 | 162.6 | 17.0 | 159.0 |
| 632 | | 161 | 51.5 | 40.8 | .4494 | .5056 | .559 | -1.15427 | 1.23342 | 78.4 | 0.791 | 24.2 | 109.6 | 16.1 | 103.4 |
| 633 | | 162 | 47.7 | 36.3 | .5048 | .4831 | .424 | 0.10581 | 0.90164 | 71.3 | 0.760 | 19.9 | 114.6 | 16.5 | 79.9 |
| 831 | | 17 | 72.5 | 78.2 | .2863 | .3290 | .385 | -1.74636 | 1.42544 | 70.3 | 1.079 | 47.6 | 110.3 | 43.0 | 142.2 |
| 832 | | 114 | 104.6 | 89.9 | .4302 | .4973 | .653 | -1.30131 | 1.24719 | 83.1 | 0.859 | 49.4 | 221.5 | 35.3 | 229.0 |
| 832 | D | 56 | 101.4 | 81.6 | .4339 | [illegible] | .636 | -1.80505 | 1.34207 | 82.6 | 0.800 | 46.7 | 213.4 | 30.3 | 219.6 |
| 841 | | 80 | 76.5 | 61.2 | .4432 | .4784 | .705 | -0.43511 | 1.11416 | 85.3 | 1.062 | 34.2 | 171.1 | 33.1 | 199.2 |
| 901 | | 25 | 94.9 | 56.6 | .2771 | .4326 | .816 | -3.66880 | 1.69214 | 93.4 | 0.596 | 57.3 | 157.3 | 29.1 | 133.0 |
| 902 | | 78 | 59.9 | 45.5 | .3177 | .3411 | .627 | -0.76654 | 1.11995 | 81.5 | 0.759 | 34.2 | 104.9 | 24.3 | 85.2 |

METH1=FRMF METH2=TGSC

| SITE | | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 648 | 71.9 | 32.9 | .4835 | .5914 | .691 | -2.21773 | 1.33577 | 85.3 | .457 | 30.9 | 167.5 | 10.6 | 101.8 |
| 632 | | 105 | 56.3 | 24.4 | .4071 | .5267 | .511 | -3.38390 | 1.63222 | 77.7 | .434 | 30.5 | 104.0 | 9.0 | 66.5 |
| 633 | | 110 | 56.5 | 25.6 | .4379 | .5248 | .373 | -3.22691 | 1.60167 | 70.4 | .449 | 30.8 | 103.7 | 9.6 | 67.1 |
| 831 | | 9 | 74.3 | 57.8 | .5572 | .6219 | .699 | -0.86681 | 1.14212 | 95.0 | .775 | 25.3 | 216.3 | 16.8 | 197.3 |
| 832 | | 94 | 118.9 | 52.6 | .4504 | .5007 | .760 | -1.52785 | 1.14907 | 88.2 | .442 | 51.9 | 272.9 | 20.3 | 136.6 |
| 832 | D | 72 | 113.0 | 59.4 | .4124 | .4076 | .679 | -0.56367 | 0.98316 | 84.0 | .526 | 52.9 | 241.0 | 28.2 | 125.1 |
| 841 | | 92 | 68.0 | 36.1 | .5887 | .7984 | .816 | -2.52618 | 1.44856 | 91.7 | .531 | 23.1 | 200.1 | 7.6 | 172.3 |
| 901 | | 121 | 82.7 | 37.4 | .2768 | .4258 | .836 | -4.84414 | 1.91722 | 85.5 | .452 | 53.6 | 127.7 | 16.3 | 86.0 |
| 902 | | 117 | 67.7 | 29.4 | .3196 | .3820 | .405 | -3.09925 | 1.53700 | 71.8 | .434 | 42.7 | 107.3 | 14.5 | 59.6 |

METH1=FRMF METH2=CHESSC

| SITE | | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 1166 | 66.3 | 46.1 | .5284 | .6086 | .629 | -1.41697 | 1.25109 | 81.9 | .695 | 26.7 | 164.9 | 14.7 | 144.1 |
| 632 | | 208 | 50.2 | 30.1 | .4661 | .5170 | .471 | -1.46934 | 1.24403 | 74.0 | .598 | 23.7 | 106.4 | 11.8 | 76.5 |
| 633 | | 207 | 46.6 | 30.3 | .5041 | .4779 | .512 | -0.04966 | 0.90114 | 75.7 | .651 | 19.0 | 114.3 | 13.5 | 68.1 |
| 831 | | 52 | 61.6 | 48.3 | .6272 | .6381 | .678 | -0.35068 | 1.02573 | 83.9 | .783 | 19.6 | 193.5 | 14.9 | 156.1 |
| 832 | | 171 | 100.2 | 66.0 | .5205 | .5624 | .584 | -1.07020 | 1.14151 | 79.3 | .658 | 40.8 | 246.5 | 23.6 | 184.3 |
| 832 | D | 111 | 104.3 | 75.5 | .3925 | .5350 | .375 | -5.64785 | 2.14568 | 73.3 | .724 | 69.5 | 164.6 | 27.0 | 211.5 |
| 841 | | 152 | 71.0 | 58.6 | .4593 | .5051 | .552 | -0.99009 | 1.15720 | 77.9 | .825 | 32.7 | 154.3 | 23.3 | 147.2 |
| 901 | | 190 | 86.2 | 64.5 | .2961 | .4005 | .319 | -6.30415 | 2.34970 | 71.1 | .749 | 62.0 | 119.6 | 29.6 | 137.9 |
| 902 | | 186 | 67.9 | 44.1 | .3791 | .5616 | .917 | -6.04992 | 2.35770 | 76.9 | .723 | 42.7 | 107.9 | 16.4 | 146.6 |

Table D-1 Continued

REGRESSION SUMMARY OF NO2 MONITORING METHODS, LOG SCALE

```
-----------------------------------------------  METH1=TEAF METH2=CHEM  ---------------------------------------------------

SITE          N    M1    M2    SD1    SD2   CCR          A         B  PCV1  RATIO  M1LOW  M1HIGH  M2LOW  M2HIGH

Overall     635  31.4  45.9  .5314  .6305  .743  -0.50639  1.25757  87.6  1.464   12.0    82.0   13.7   153.7
632         162  27.0  37.5  .4465  .5261  .686  -0.55560  1.26884  84.8  1.391   12.3    59.2   13.8   101.6
633         170  23.3  31.2  .4919  .6053  .616  -0.95207  1.39511  81.8  1.338   10.2    53.0    9.9    98.1
831          14  39.7  54.9  .4962  .4621  .441   0.87280  0.85119  72.3  1.384   16.5    95.4   26.0   115.9
832          90  46.8  66.9  .4995  .5558  .684  -0.28618  1.16873  84.4  1.436   19.1   113.7   23.6   [illegible]
832   D      48  60.0  85.3  .4678  .5875  .776  -1.03639  1.33921  89.5  1.422   25.6   140.3   27.3   [illegible]
841          76  41.7  61.9  .5566  .5156  .700   1.00142  0.89657  85.1  1.965   14.7   112.1   32.7   209.4
901          42  46.5  72.9  .2994  .2812  .832   0.72805  0.92730  91.6  1.567   26.1    82.9   42.7   124.5
902          81  30.7  45.4  .3091  .3976  .645  -1.21785  1.40970  83.6  1.472   18.3    51.6   21.2    97.3

-----------------------------------------------  METH1=TEAF METH2=CHRF  ---------------------------------------------------

SITE          N    M1    M2    SD1    SD2   CCR          A         B  PCV1  RATIO  M1LOW  M1HIGH  M2LOW  M2HIGH

Overall    1310  33.2  42.6  .5480  .5247  .839   .422243  0.94956  92.0  1.284   11.6    95.8   15.5   116.1
632         217  25.5  31.5  .4641  .4435  .741   .401851  0.94073  87.1  1.231   10.7    61.1   13.9    71.6
633         223  22.4  30.2  .5273  .4759  .746   .655997  0.87198  87.5  1.347    9.2    61.1   12.6    72.4
831          50  41.0  47.6  .4990  .4866  .823   .241361  0.97471  91.1  1.159   15.8   106.6   18.7   120.6
832         174  47.0  59.6  .5641  .5159  .870   .614096  0.90234  93.5  1.269   15.7   140.9   22.2   160.6
832   D     123  57.0  71.8  .5021  .4458  .882   .740089  0.87387  94.2  1.259   21.4   152.2   30.4   169.2
841         171  39.1  50.9  .6250  .5679  .784   .585847  0.88496  89.3  1.302   11.6   129.1   17.7   146.5
901         239  40.7  54.8  .3444  .3334  .807   .443781  0.90066  90.4  1.347   21.1    78.5   29.1   103.0
902         236  32.8  40.5  .3897  .4100  .837  -.000550  1.00254  91.9  1.236   15.6    66.9   18.4    89.3

-----------------------------------------------  METH1=TEAF METH2=CHRC  ---------------------------------------------------

SITE          N    M1    M2    SD1    SD2   CCR          A         B  PCV1  RATIO  M1LOW  M1HIGH  M2LOW  M2HIGH

Overall    1285  33.0  41.0  .5427  .5158  .841   .420810  0.94138  92.1  1.241   11.6    94.1   15.3   109.8
632         221  25.5  31.0  .4641  .4605  .748   .238930  0.96967  87.4  1.216   10.7    60.9   13.1    73.4
633         224  22.3  29.2  .5313  .4689  .784   .726415  0.85301  89.4  1.310    6.1    61.9   12.3    69.8
831          49  38.0  42.7  .5176  .5251  .722   .044658  1.01992  86.1  1.124   14.6    99.0   16.1   113.4
832         155  47.3  57.1  .3751  .5047  .877   .276096  0.97758  93.9  1.209   15.5   144.5   19.2   170.4
832   D     124  57.9  68.2  .4351  .3736  .835   .639512  0.83332  91.9  1.177   24.9   134.8   33.7   137.8
841         163  40.4  52.2  .5702  .5028  .762   .619547  0.84031  88.3  1.294   13.6   120.1   20.7   131.6
901         237  40.9  51.7  .3443  .3147  .782   .635836  0.89160  89.2  1.263   21.2    79.0   28.8    92.9
902         236  32.9  39.2  .3901  .3896  .848   .179893  0.99860  92.4  1.191   15.5    69.7   18.5    82.9

-----------------------------------------------  METH1=TEAF METH2=TECH  ---------------------------------------------------

SITE          N    M1    M2    SD1    SD2   CCR          A         B  PCV1  RATIO  M1LOW  M1HIGH  M2LOW  M2HIGH

Overall     266  25.0  50.0  .4873  .5186  .674   .380244  1.09686  83.8  1.998   10.4    60.2   19.1   131.1
632         132  25.9  47.4  .4551  .4760  .556   .331369  1.08407  77.8  1.831   11.8    56.9   20.2   111.4
633         134  24.3  52.8  .5162  .5536  .783   .480151  1.09348  89.2  2.178    9.2    63.7   18.4   151.7
```

Table D-1 Continued

REGRESSION SUMMARY OF NO2 MONITORING METHODS, LOG SCALE

METH1=TEAF METH2=TECH

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 619 | 30.4 | 50.1 | .5443 | .5730 | .751 | 0.23966 | 1.07086 | 87.6 | 1.621 | 11.3 | 84.8 | 17.0 | 107.7 |
| 632 | 164 | 25.8 | 40.8 | .4679 | .5137 | .643 | -0.34608 | 1.15010 | 82.3 | 1.585 | 11.3 | 56.8 | 15.7 | 106.0 |
| 633 | 161 | 23.0 | 36.2 | .5112 | .4847 | .621 | 0.71278 | 0.91789 | 81.1 | 1.577 | 9.0 | 58.5 | 15.4 | 85.5 |
| 831 | 17 | 44.4 | 75.3 | .3674 | .3304 | .898 | 0.95217 | 0.85841 | 95.0 | 1.697 | 21.6 | 91.1 | 39.7 | 142.8 |
| 832 | 102 | 45.1 | 82.0 | .4940 | .4739 | .634 | 0.83919 | 0.93653 | 81.8 | 1.817 | 18.3 | 111.4 | 35.2 | 191.1 |
| 832 D | 49 | 57.9 | 78.8 | .4466 | .5323 | .905 | -0.75991 | 1.21386 | 95.4 | 1.361 | 24.4 | 137.3 | 27.6 | 224.7 |
| 841 | 71 | 44.0 | 80.1 | .4508 | .4019 | .712 | 0.10590 | 1.13053 | 85.7 | 1.822 | 19.4 | 95.7 | 31.7 | 202.0 |
| 901 | 25 | 49.3 | 56.2 | .3100 | .4078 | [illegible] | -1.40381 | 1.39430 | 91.7 | 1.142 | 27.6 | 87.3 | 25.3 | 174.8 |
| 902 | 79 | 29.4 | 45.3 | .3866 | .3444 | .809 | 0.88275 | 0.86083 | 90.1 | 1.541 | 14.0 | 62.0 | 23.8 | 80.5 |

METH1=TEAF METH2=TGSU

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 625 | 33.7 | 32.2 | .5138 | .5773 | .751 | -0.63426 | 1.10757 | 87.8 | 0.956 | 13.1 | 86.3 | 10.7 | 96.0 |
| 632 | 110 | 27.4 | 24.0 | .4503 | .5189 | .598 | -1.01416 | 1.26568 | 80.4 | 0.874 | 12.8 | 52.8 | 9.1 | 63.0 |
| 633 | 110 | 26.1 | 25.4 | .4064 | .5278 | .649 | -0.77915 | 1.24231 | 83.1 | 0.974 | 12.1 | 56.4 | 9.4 | 68.8 |
| 831 | 9 | 43.6 | 52.7 | .4275 | .5907 | .852 | -1.54018 | 1.45798 | 93.4 | 1.208 | 19.7 | 98.8 | 16.5 | 168.4 |
| 832 | 84 | 52.3 | 51.1 | .5859 | .4817 | .730 | 0.90367 | 0.76577 | 87.1 | 0.977 | 17.0 | 161.0 | 21.6 | 123.9 |
| 832 D | 72 | 64.6 | 57.7 | .4729 | .4616 | .841 | 0.00547 | 0.97168 | 92.3 | 0.894 | 26.0 | 160.3 | 23.8 | 139.6 |
| 841 | 80 | 36.4 | 35.9 | .6829 | .7767 | .831 | -0.62525 | 1.16727 | 91.7 | 0.976 | 10.0 | 131.9 | 7.9 | 159.7 |
| 901 | 120 | 30.6 | 37.4 | .3187 | .4239 | .671 | -1.94725 | 1.51963 | 85.1 | 1.023 | 21.4 | 62.6 | 16.5 | 94.7 |
| 902 | 112 | 32.2 | 29.2 | .3275 | .3905 | .616 | -1.23565 | 1.32735 | 81.6 | 0.906 | 16.5 | 56.1 | 14.0 | 80.9 |

METH1=TEAF METH2=LMESSC

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 1141 | 32.5 | 45.4 | .5449 | .5991 | .633 | -0.22723 | 1.10143 | 81.9 | 1.397 | 12.5 | 84.5 | 15.0 | 137.8 |
| 632 | 212 | 25.1 | 30.3 | .4600 | .5146 | .589 | -0.48623 | 1.20880 | 79.8 | 1.206 | 11.5 | 55.2 | 11.7 | 78.4 |
| 633 | 205 | 21.9 | 30.2 | .5290 | .4780 | .467 | 0.92221 | 0.80581 | 73.6 | 1.382 | 8.4 | 56.7 | 14.0 | 65.1 |
| 831 | 50 | 39.1 | 42.5 | .5319 | .6351 | .572 | -1.33321 | 1.35939 | 79.5 | 1.088 | 10.3 | 93.8 | 12.9 | 139.8 |
| 832 | 154 | 46.2 | 64.1 | .5239 | .5463 | .602 | 0.35083 | 1.07202 | 80.1 | 1.387 | 13.3 | 116.5 | 23.8 | 172.6 |
| 832 D | 110 | 57.9 | 74.7 | .4373 | .5654 | .515 | -2.27855 | 1.62422 | 77.9 | 1.290 | 29.9 | 116.2 | 25.5 | 218.8 |
| 841 | 142 | 39.7 | 59.4 | .5743 | .4718 | .519 | 1.32994 | 0.74396 | 76.8 | 1.473 | 13.7 | 114.9 | 26.5 | 126.8 |
| 901 | 192 | 40.7 | 65.0 | .3460 | .3975 | .413 | -0.98585 | 1.39184 | 71.6 | 1.595 | 24.2 | 68.5 | 31.5 | 134.0 |
| 902 | 166 | 32.5 | 49.1 | .4037 | .5468 | .478 | -2.49092 | 1.83443 | 77.2 | 1.512 | 18.3 | 57.5 | 17.2 | 140.1 |

METH1=TECH METH2=CHEM

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 222 | 48.5 | 38.4 | .5570 | .5752 | .577 | -.455741 | 1.05737 | 78.9 | .792 | 18.3 | 128.9 | 13.7 | 108.0 |
| 632 | 108 | 43.6 | 39.0 | .5112 | .5329 | .525 | -.420048 | 1.08223 | 76.3 | .891 | 18.2 | 105.0 | 15.1 | 100.5 |
| 633 | 114 | 53.5 | 37.9 | .5822 | .6143 | .639 | -.692497 | 1.08744 | 82.0 | .709 | 18.9 | 151.0 | 12.3 | 117.2 |

Table D-1 Continued
REGRESSION SUMMARY OF NO2 MONITORING METHODS, LOG SCALE

METH1=TECH METH2=TECH

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 227 | 51.5 | 39.8 | .5501 | .4885 | .585 | .463371 | .817037 | 79.6 | .772 | 18.4 | 102.4 | 17.3 | 91.3 |
| e32 | 114 | 48.6 | 42.9 | .5141 | [illegible] | .513 | .604111 | .967039 | 75.2 | .863 | 19.8 | 119.3 | 18.0 | 102.3 |
| e33 | 113 | 54.7 | 36.9 | .5801 | .4601 | .726 | .692372 | .728551 | 87.1 | .675 | 17.9 | 167.1 | 16.3 | 85.2 |

METH1=TECH METH2=CHEM

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 545 | 53.4 | 49.8 | .5983 | .6345 | .773 | -0.38398 | 1.07896 | 88.7 | 0.932 | 17.5 | 163.1 | 14.9 | 166.1 |
| e32 | 126 | 40.5 | 36.0 | .5378 | .5172 | .531 | 0.14273 | 0.92927 | 76.6 | 0.888 | 15.8 | 105.4 | 14.8 | 87.5 |
| e33 | 132 | 34.8 | 33.2 | .4565 | .6055 | .592 | -2.15578 | 1.59346 | 81.6 | 0.952 | 16.8 | 72.1 | 10.4 | 165.9 |
| e31 | 12 | 59.5 | 44.0 | .4797 | .4451 | .883 | 0.02933 | 0.91892 | 94.2 | 0.739 | 23.3 | 151.6 | 18.6 | 103.9 |
| 832 | 107 | 91.1 | 74.2 | .4559 | .5108 | .903 | -0.81170 | 1.13435 | 95.2 | 0.814 | 37.7 | 220.0 | 27.2 | 202.1 |
| 832 D | 54 | 85.9 | 93.2 | .5218 | .5859 | .908 | -0.52336 | 1.13596 | 95.5 | 1.086 | 31.2 | 236.6 | 29.5 | 294.7 |
| 841 | 80 | 85.5 | 78.9 | .4092 | .3770 | .706 | 0.52217 | 0.89047 | [illegible] | [illegible] | 39.7 | 154.3 | 44.9 | 176.2 |
| 901 | 28 | 58.0 | 80.5 | .4215 | .2865 | .856 | 1.75118 | 0.63954 | 93.8 | 1.387 | 25.3 | 133.3 | 47.3 | 137.0 |
| 902 | 60 | 47.3 | 44.8 | .3094 | .3469 | .516 | -1.58803 | 1.39737 | 77.0 | 0.946 | 29.0 | 77.4 | 22.5 | 99.1 |

METH1=TGSC METH2=CHEM

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 351 | 30.2 | 47.1 | .5763 | .6426 | .619 | -0.20835 | 1.19174 | 81.2 | 1.561 | 11.1 | 82.1 | 14.3 | 155.3 |
| e32 | 112 | 23.9 | 39.6 | .5189 | .5501 | .327 | -0.11261 | 1.19448 | 56.6 | 1.656 | 10.8 | 52.8 | 15.4 | 102.0 |
| e33 | 106 | 26.0 | 34.8 | .5290 | .6322 | .548 | -0.94251 | 1.37885 | 78.4 | 1.339 | 11.0 | 61.2 | 10.7 | 113.4 |
| 832 | 53 | 47.7 | 86.6 | .4775 | .4339 | .864 | 1.03050 | 0.89530 | 93.3 | 1.814 | 15.9 | 120.8 | 37.7 | 198.9 |
| 832 D | 22 | 56.0 | 122.2 | .4631 | .5235 | .936 | 1.14399 | 1.15784 | 92.0 | 2.180 | 23.3 | 134.6 | 44.3 | 337.0 |
| 841 | 27 | 43.6 | 87.5 | .6410 | .4363 | .808 | 2.11291 | 0.62471 | 91.8 | 2.006 | 12.4 | 153.8 | 39.8 | 192.3 |
| 901 | 9 | 41.5 | 78.9 | .2953 | .3154 | .940 | 0.37414 | 1.07229 | 97.0 | 1.903 | 23.2 | 74.1 | 42.4 | 147.1 |
| 902 | 44 | 34.0 | 45.3 | .4516 | .4244 | .370 | 0.82885 | 0.84636 | 68.7 | 1.333 | 15.5 | 74.4 | 23.3 | 87.9 |

METH1=TGSC METH2=TECH

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 191 | 25.2 | 48.9 | .5146 | .5394 | .483 | .333328 | 1.10223 | 74.2 | 1.941 | 10.6 | 59.8 | 18.9 | 126.7 |
| e32 | 95 | 24.0 | 44.9 | .4938 | .4778 | .384 | .867817 | 0.91817 | 69.3 | 1.874 | 10.3 | 55.8 | 20.7 | 97.3 |
| e33 | 96 | 26.5 | 53.3 | .5317 | .5838 | .546 | .068272 | 1.18611 | 77.6 | 2.010 | 10.8 | 64.9 | 18.4 | [illegible] |

Table D-1 Continued

REGRESSION SUMMARY OF NO2 MONITORING METHODS, LOG SCALE

METH1=TGSC METH2=TEC4

| SITE | | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 302 | 32.8 | 54.2 | .6316 | .6251 | .703 | 0.55281 | 0.98531 | 85.1 | 1.651 | 10.2 | 105.6 | 17.1 | 171.4 |
| 632 | | 79 | 24.7 | 43.1 | .5386 | .5259 | .642 | 0.67517 | 0.96369 | 82.1 | 1.749 | 9.2 | 65.9 | 16.7 | 111.2 |
| 633 | | 81 | 26.9 | 35.6 | .5603 | .4470 | .387 | 1.69057 | 0.57134 | 71.9 | 1.322 | 9.4 | 77.3 | 19.5 | 65.0 |
| 831 | | 6 | 82.4 | 83.3 | .2959 | .2874 | .028 | 0.20968 | 0.95494 | 81.4 | 1.011 | 48.1 | 141.1 | 49.8 | 139.2 |
| 832 | | 59 | 47.9 | 112.0 | .4953 | .4187 | .739 | 1.63406 | 0.79707 | 87.4 | 2.337 | 18.6 | 123.7 | 52.6 | 238.5 |
| 832 | D | 19 | 61.3 | 126.4 | .4076 | [illegible] | .887 | 0.50522 | 1.05313 | 94.4 | 2.062 | 27.8 | 135.0 | 55.1 | 290.4 |
| 841 | | 32 | 40.8 | 75.6 | .8920 | .6057 | .954 | 1.85196 | 0.66716 | 96.0 | 1.855 | 6.9 | 240.7 | 23.1 | 247.2 |
| 901 | | 8 | 42.6 | 59.5 | .3048 | .3510 | .717 | -0.47754 | 1.21661 | 80.2 | 1.398 | 24.6 | 73.6 | 30.5 | 115.9 |
| 902 | | 37 | 34.5 | 47.8 | .4367 | .2514 | .750 | 2.13137 | 0.49043 | 91.0 | 1.387 | 14.6 | 81.8 | 31.3 | 73.1 |

METH1=CHESSC METH2=CHEM

| SITE | | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 645 | 43.7 | 47.4 | .6077 | .6505 | .625 | -0.35047 | 1.11482 | 81.4 | 1.087 | 14.9 | 127.6 | 14.3 | 156.0 |
| 632 | | 164 | 32.3 | 36.9 | .5423 | .5070 | .487 | 0.56048 | 0.87111 | 74.5 | 1.142 | 12.3 | 84.9 | 15.9 | 85.6 |
| 633 | | 164 | 32.6 | 31.7 | .4829 | .6093 | .399 | -2.64673 | 1.74694 | 72.5 | 0.967 | 17.0 | 63.2 | 10.0 | 100.0 |
| 831 | | 16 | 56.0 | 70.4 | .3653 | .6391 | .647 | -4.85593 | 2.26363 | 87.7 | 1.259 | 32.1 | 97.7 | 20.0 | 240.0 |
| 832 | | 116 | 66.4 | 74.0 | .5862 | .5453 | .492 | 0.68167 | 0.86340 | 74.8 | 1.115 | 23.3 | 169.4 | 29.9 | 182.9 |
| 832 | D | 52 | 70.3 | 83.4 | .6208 | .6020 | .563 | 0.39646 | 0.94693 | 76.2 | 1.186 | 23.2 | 213.5 | 29.2 | 238.8 |
| 841 | | 75 | 62.4 | 83.8 | .4701 | .5020 | .661 | -0.18101 | 1.11532 | 80.1 | 1.344 | 27.4 | 141.9 | 33.5 | 209.7 |
| 901 | | 30 | 78.2 | 76.3 | .3054 | .3073 | .378 | -0.66692 | 1.01675 | 68.9 | 0.975 | 47.2 | 129.5 | 45.7 | 127.5 |
| 902 | | 80 | 43.5 | 43.3 | .5286 | .4266 | .475 | 1.34224 | 0.64283 | 75.5 | 0.995 | 16.1 | 117.4 | 22.8 | 81.9 |

METH1=CHESSC METH2=TECH

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 261 | 30.7 | 47.9 | .5219 | .5490 | .338 | -.104766 | 1.16065 | 67.1 | 1.561 | 13.6 | 68.9 | 18.7 | 122.5 |
| 632 | 136 | 29.6 | 45.3 | .5335 | .5158 | .263 | .834107 | 0.87954 | 63.3 | 1.531 | 12.2 | 71.7 | 20.8 | 98.7 |
| 633 | 125 | 31.9 | 50.9 | .5076 | .5786 | .406 | -.830547 | 1.37427 | 71.1 | 1.593 | 14.9 | 68.5 | 17.8 | 145.4 |

METH1=CHESSC METH2=TEC4

| SITE | | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | | 635 | 42.0 | 52.3 | .6302 | .5920 | .604 | 0.58776 | 0.90162 | 80.3 | 1.246 | 13.3 | 132.8 | 18.5 | 147.7 |
| 632 | | 170 | 29.9 | 40.9 | .5354 | .4946 | .316 | 1.05904 | 0.78026 | 66.3 | 1.366 | 11.7 | 76.3 | 19.7 | 84.9 |
| 633 | | 160 | 30.5 | 35.9 | .5130 | .4760 | .284 | 0.94651 | 0.77049 | 64.6 | 1.176 | 12.5 | 74.4 | 18.1 | 71.3 |
| 831 | | 19 | 60.6 | 83.7 | .3920 | .3277 | .730 | 1.21331 | 0.78327 | 87.0 | 1.383 | 28.6 | 128.2 | 46.5 | 150.7 |
| 832 | | 123 | 66.0 | 88.4 | .5388 | .4788 | .624 | 0.98724 | 0.82824 | 81.5 | 1.300 | 24.9 | 185.2 | 38.5 | 202.8 |
| 832 | D | 53 | 72.5 | 79.3 | .5157 | .5179 | .688 | 0.66333 | 1.00619 | 84.4 | 1.094 | 28.1 | 186.9 | 30.6 | 205.7 |
| 841 | | 72 | 63.7 | 85.6 | .4477 | .4193 | .384 | 0.94446 | 0.84368 | 69.5 | 1.343 | 29.2 | 139.2 | 44.3 | 165.4 |
| 901 | | 20 | 86.5 | 60.8 | .2899 | .4567 | .392 | -8.22102 | 2.76415 | 77.7 | 0.703 | 62.5 | 119.7 | 24.4 | 149.1 |
| 902 | | 71 | 40.8 | 45.7 | .5071 | .3514 | .453 | 2.07945 | 0.47016 | 77.5 | 1.121 | 15.3 | 109.0 | 28.8 | 72.6 |

Table D-1 Continued

REGRESSION SUMMARY OF NO2 MONITORING METHODS, LOG SCALE

METH1=CHESSC METH2=TGSC

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 556 | 50.7 | 32.9 | .6019 | .5579 | .522 | 0.05841 | 0.86481 | 76.3 | 0.649 | 17.1 | 149.9 | 12.9 | 84.0 |
| 832 | 101 | 32.8 | 23.7 | .5353 | .5765 | .295 | 0.[illegible]6909 | 0.82966 | 65.0 | 0.722 | 13.2 | 81.9 | 11.1 | 50.8 |
| 833 | 96 | 35.3 | 24.3 | .4708 | [illegible] | [illegible] | -0.[illegible]7254 | 1.16788 | 67.4 | 0.688 | 17.0 | 73.4 | 10.4 | 57.[illegible] |
| 831 | 11 | 47.0 | 59.8 | .5457 | [illegible] | .725 | 0.61955 | 0.90167 | 86.3 | 1.272 | 13.9 | 158.5 | 20.0 | [illegible] |
| 832 | 66 | 82.0 | 50.0 | .5610 | .4665 | [illegible] | 0.51831 | 0.77026 | 77.7 | 0.610 | 29.1 | 231.3 | 22.5 | [illegible] |
| 832 D | 68 | 88.0 | 55.9 | .5219 | .4593 | [illegible] | [illegible].54480 | 0.77708 | 75.7 | 0.636 | 33.9 | 226.8 | 26.6 | [illegible].5 |
| 841 | 78 | 59.1 | 38.7 | .5368 | .5698 | .466 | -0.[illegible]7927 | 1.13629 | 73.4 | 0.655 | 24.3 | 143.4 | 19.1 | 105.9 |
| 901 | 98 | 64.2 | 38.1 | .3814 | .4333 | .317 | -2.52884 | 1.48201 | 66.9 | 0.594 | 37.8 | 108.8 | 17.4 | 83.4 |
| 902 | 86 | 52.4 | 30.1 | .5476 | .3957 | .191 | 2.34515 | 0.20757 | 66.1 | 0.575 | 17.8 | 153.7 | 22.6 | 40.1 |

METH1=CHRF METH2=CHEM

| SITE | N | M1 | M2 | SD1 | SD2 | CCR | A | B | PCV1 | RATIO | M1LOW | M1HIGH | M2LOW | M2HIGH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 663 | 41.4 | 47.2 | .5192 | .6413 | .690 | -1.19087 | 1.35468 | 85.3 | 1.139 | 16.8 | 102.5 | 13.8 | 160.[illegible] |
| 832 | 161 | 33.6 | 37.2 | .4475 | .5338 | .535 | -1.25258 | 1.36521 | 77.7 | 1.107 | 16.4 | 69.0 | 13.7 | [illegible] |
| 833 | 170 | 32.6 | 31.1 | .4333 | .6054 | .467 | -3.4[illegible]264 | 1.96810 | [illegible]7.4 | 0.953 | 16.0 | 59.1 | 9.7 | [illegible] |
| 831 | 12 | 54.7 | 53.8 | .3920 | .4868 | .658 | -1.1[illegible]268 | 1.28625 | [illegible]3.2 | 0.983 | 26.1 | 114.8 | 20.8 | 139.[illegible] |
| 832 | 114 | 59.2 | 71.6 | .4870 | .5024 | .625 | -0.57723 | 1.16769 | [illegible]1.5 | 1.208 | 25.4 | 138.3 | 26.1 | [illegible] |
| 832 D | 61 | 77.5 | 87.3 | .3747 | .5763 | .646 | -3.88288 | 1.87407 | 85.7 | 1.127 | 42.4 | 141.6 | 28.2 | 270.4 |
| 841 | 81 | 54.2 | 81.7 | .5164 | .5026 | .752 | 0.54382 | 0.96036 | 89.6 | 1.506 | 20.3 | 144.7 | 31.7 | 210.9 |
| 901 | 44 | 69.8 | 74.4 | .3298 | .2941 | .753 | 0.66157 | 0.85927 | 87.8 | 1.066 | 37.2 | 130.8 | 43.4 | 127.6 |
| 902 | 61 | 34.7 | 44.8 | .3139 | .4031 | .586 | -1.58933 | 1.52060 | 80.9 | 1.293 | 20.9 | 57.5 | 20.8 | 96.7 |

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1/ Note if M1LOW or M2LOW was negative it was set at 0 μg/m³.

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### Table D-2

### Ordinary Regression Results Over Sites[1/] Using the Model Y = A + BX

| | | | | | | Ordinary Regression | | Orthogonal[3/] Regression | |
|---|---|---|---|---|---|---|---|---|---|
| Y=CHEM[2/] | | | | | | | | | |
| X | N | CORR | MEANX | STDX | STDY_X | A | B | A | B |
| CHRF | 663 | .73 | 47.2 | 24.71 | 24.10 | 8.0210 | 1.03642 | -19.0 | 1.609 |
| CHRC | 650 | .74 | 44.5 | 22.78 | 23.37 | 6.6253 | 1.11743 | -21.0 | 1.738 |
| FRMF | 648 | .69 | 72.1 | 36.75 | 25.45 | 9.5627 | 0.65320 | -10.4 | 0.930 |
| TEAF | 635 | .76 | 35.9 | 19.20 | 21.92 | 7.6649 | 1.32020 | -18.1 | 2.039 |
| TECH | 222 | .64 | 56.0 | 30.35 | 17.00 | 17.9763 | 0.46970 | 9.6 | 0.620 |
| TEC4 | 545 | .83 | 63.5 | 39.26 | 20.61 | 10.8366 | 0.77270 | 1.4 | 0.921 |
| TGSC | 351 | .73 | 35.7 | 22.52 | 23.94 | 16.2892 | 1.13363 | -7.5 | 1.801 |
| CHESSC | 645 | .60 | 52.3 | 33.51 | 29.95 | 23.0797 | 0.66307 | -4.7 | 1.195 |
| Y=CHRF | | | | | | | | | |
| X | N | CORR | MEANX | STDX | STDY_X | A | B | A | B |
| CHEM | 663 | .73 | 56.9 | 35.16 | 16.94 | 18.0293 | 0.51207 | 11.8 | 0.621 |
| CHRO | 1326 | .93 | 47.0 | 24.02 | 9.62 | 2.5957 | 0.98836 | -1.3 | 1.072 |
| FRMF | 1337 | .77 | 76.6 | 39.25 | 16.24 | 10.4103 | 0.50395 | 4.5 | 0.581 |
| TEAF | 1310 | .85 | 38.1 | 20.58 | 13.32 | 9.3109 | 1.02690 | 0.5 | 1.257 |
| TECH | 268 | .71 | 56.8 | 28.78 | 9.92 | 12.2862 | 0.34628 | 10.0 | 0.387 |
| TEC4 | 655 | .72 | 62.2 | 39.57 | 17.41 | 18.3877 | 0.45031 | 13.2 | 0.533 |
| TGSC | 650 | .80 | 38.9 | 24.67 | 14.88 | 15.6494 | 0.81727 | 7.8 | 1.019 |
| CHESSC | 1184 | .62 | 55.1 | 33.32 | 19.74 | 22.5706 | 0.46764 | 13.0 | 0.640 |
| Y=CHRO | | | | | | | | | |
| X | N | CORR | MEANX | STDX | STDY_X | A | B | A | B |
| CHEM | 650 | .74 | 56.4 | 34.54 | 15.41 | 17.1376 | .485917 | 12.1 | 0.575 |
| CHRF | 1326 | .93 | 49.0 | 25.61 | 9.02 | 4.3720 | .869073 | 1.2 | 0.933 |
| FRMF | 1313 | .79 | 76.0 | 38.61 | 14.82 | 9.6672 | .489916 | 4.8 | 0.554 |
| TEAF | 1285 | .86 | 37.9 | 20.48 | 11.95 | 9.4848 | .972503 | 2.5 | 1.158 |
| TECH | 270 | .68 | 56.7 | 28.72 | 10.34 | 13.5905 | .331521 | 11.2 | 0.375 |
| TEC4 | 643 | .75 | 61.7 | 39.29 | 15.06 | 16.9421 | .437466 | 13.2 | 0.497 |
| TGSC | 633 | .79 | 38.7 | 24.71 | 14.70 | 16.9420 | .765808 | 9.4 | 0.961 |
| CHESSO | 1169 | .59 | 54.6 | 32.84 | 19.11 | 22.9069 | .428368 | 14.0 | 0.591 |

Table D-2 (Continued)

| | | | | | | Ordinary Regression | | Orthogonal Regression | |
|---|---|---|---|---|---|---|---|---|---|
| Y=FRMF | | | | | | | | | |
| X | N | CORR | MEANX | STDX | STDY_X | A | B | A | B |
| CHEM | 648 | .69 | 56.6 | 34.97 | 26.74 | 31.2107 | 0.72152 | 11.2 | 1.075 |
| CHRF | 1337 | .77 | [illegible] | 25.59 | 24.91 | 18.5059 | 1.18561 | -7.8 | [illegible] |
| CHRC | 1313 | .79 | 46.9 | 24.02 | 23.81 | 16.6380 | 1.26532 | -8.7 | [illegible] |
| TEAF | 1290 | .81 | 38.1 | [illegible] | 22.49 | 18.5341 | 1.49228 | -4.2 | [illegible] |
| TECH | 265 | .55 | 56.3 | 28.59 | 21.82 | 27.8044 | 0.50038 | 8.4 | 0.845 |
| TEC4 | 637 | .71 | 61.9 | 40.00 | 27.17 | 29.8971 | 0.68942 | 13.5 | 0.955 |
| TGSC | 648 | .69 | 39.0 | 25.02 | 29.89 | 36.3771 | 1.13508 | 2.3 | 2.007 |
| CHESSC | 1166 | .59 | 54.9 | 33.48 | 31.79 | 37.1078 | 0.70103 | 3.2 | 1.318 |

| Y=TEAF | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| X | N | CORR | MEANX | STDX | STDY_X | A | B | A | B |
| CHEM | 635 | .76 | 55.0 | 33.50 | 12.56 | 12.0212 | .433552 | 8.9 | .490 |
| CHRF | 1310 | .85 | 48.5 | 24.98 | 10.98 | 4.3552 | .696949 | -0.4 | .796 |
| CHRC | 1285 | .86 | 46.4 | 23.22 | 10.54 | 2.8590 | .756305 | -2.1 | .864 |
| FRMF | 1290 | .81 | 75.3 | 38.24 | 12.19 | 5.0310 | .438469 | 2.0 | .479 |
| TECH | 266 | .73 | 56.8 | 28.76 | 9.32 | 8.5463 | .343889 | 6.6 | .379 |
| TEC4 | 619 | .76 | 58.8 | 35.61 | 12.55 | 11.5880 | .408264 | 8.8 | .456 |
| TGSC | 625 | .76 | 37.8 | 23.64 | 13.94 | 12.1165 | .693430 | 4.9 | .884 |
| CHESSC | 1141 | .61 | 53.8 | 32.36 | 16.16 | 16.5383 | .387399 | 11.0 | .490 |

| Y=TECH | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| X | N | CORR | MEANX | STDX | STDY_X | A | B | A | B |
| CHEM | 222 | .64 | 44.3 | 22.15 | 23.28 | 16.9914 | 0.88158 | -15.5 | 1.614 |
| CHRF | 268 | .71 | 32.0 | 14.05 | 20.33 | 10.3883 | 1.45309 | -25.8 | 2.586 |
| CHRC | 270 | .68 | 32.4 | 14.04 | 21.15 | 11.7587 | 1.38706 | -29.8 | 2.670 |
| FRMF | 265 | .55 | 56.0 | 26.06 | 23.94 | 22.6021 | 0.60218 | -9.9 | 1.183 |
| TEAF | 266 | .73 | 28.1 | 13.58 | 19.74 | 13.4677 | 1.54328 | -17.3 | 2.639 |
| TEC4 | 227 | .56 | 44.6 | 21.31 | 25.41 | 23.3388 | 0.80393 | -23.7 | 1.859 |
| TGSC | 191 | .54 | 28.8 | 16.34 | 25.15 | 27.8488 | 0.97984 | -22.[illegible] | 2.731 |
| CHESSC | 261 | .29 | 35.0 | 19.58 | 27.89 | 39.8668 | 0.43376 | -53.8 | 3.108 |

Table D-2 (Continued)

| | | | | | | Ordinary Regression | | Orthogonal Regression | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Y=TEC4 | | | | | |
| X | N | CORR | MEANX | STDX | STDY_X | A | B | A | B |
| CHEM | 545 | .83 | 59.9 | 36.66 | 22.07 | 10.4302 | 0.88602 | -1.6 | 1.086 |
| CHRF | 655 | .72 | 46.4 | 24.90 | 27.66 | 9.4780 | 1.13678 | -24.8 | 1.874 |
| CHRC | 643 | .75 | 43.9 | 22.84 | 25.90 | 4.8620 | 1.29390 | -26.6 | 2.010 |
| FRMF | 637 | .71 | 72.6 | 38.70 | 28.08 | 8.4260 | 0.73682 | -14.1 | 1.048 |
| TEAF | 619 | .76 | 35.6 | 19.20 | 23.28 | 8.8325 | 1.40417 | -19.3 | 2.193 |
| TECH | 227 | .56 | 59.2 | 30.59 | 17.69 | 21.4998 | 0.38989 | 12.7 | 0.538 |
| TGSC | 302 | .72 | 39.5 | 25.24 | 31.92 | 13.7136 | 1.32119 | -21.8 | 2.221 |
| CHESSC | 635 | .65 | 51.1 | 34.68 | 30.35 | 24.4531 | 0.74053 | -0.7 | 1.234 |
| | | | | Y=TGSC | | | | | |
| X | N | CORR | MEANX | STDX | STDY_X | A | B | A | B |
| CHEM | 351 | .73 | 56.8 | 34.98 | 15.41 | 9.0190 | .470008 | 4.2 | 0.555 |
| CHRF | 650 | .80 | 47.4 | 25.05 | 14.65 | 1.2905 | .792634 | -7.7 | 0.981 |
| CHRC | 633 | .79 | 46.6 | 23.95 | 15.16 | 0.7246 | .815165 | -9.8 | 1.040 |
| FRMF | 648 | .69 | 80.7 | 41.21 | 18.15 | 5.2663 | .418348 | -1.2 | 0.498 |
| TEAF | 625 | .76 | 38.4 | 21.51 | 15.32 | 5.7307 | .837159 | -5.6 | 1.131 |
| TECH | 191 | .54 | 56.1 | 29.76 | 13.81 | 12.2607 | .295344 | 8.3 | 0.366 |
| TEC4 | 302 | .72 | 65.9 | 46.13 | 17.47 | 13.4353 | .395623 | 9.8 | 0.450 |
| CHESSC | 556 | .50 | 60.1 | 36.42 | 21.07 | 18.7496 | .330046 | 10.7 | 0.465 |
| | | | | Y=CHESSC | | | | | |
| X | N | CORR | MEANX | STDX | STDY_X | A | B | A | B |
| CHEM | 645 | .60 | 57.7 | 37.27 | 26.92 | 21.3187 | .535909 | 3.9 | 0.837 |
| CHRF | 1184 | .62 | 48.4 | 25.14 | 26.16 | 15.4157 | .821484 | -20.4 | 1.561 |
| CHRC | 1169 | .59 | 46.3 | 23.64 | 26.30 | 17.0055 | .811535 | -23.8 | 1.693 |
| FRMF | 1166 | .59 | 75.6 | 39.50 | 26.94 | 16.8442 | .503481 | -2.4 | 0.759 |
| TEAF | 1141 | .61 | 37.4 | 20.45 | 25.58 | 17.5435 | .970117 | -22.5 | 2.041 |
| TECH | 261 | .29 | 55.1 | 29.11 | 18.77 | 24.2012 | .196389 | 17.3 | 0.322 |
| TEC4 | 635 | .65 | 62.3 | 39.74 | 26.49 | 15.9479 | .563888 | 0.6 | 0.811 |
| TGSC | 556 | .50 | 38.6 | 24.25 | 31.66 | 31.3715 | .744801 | -22.9 | 2.152 |

Table D-2 (Continued)

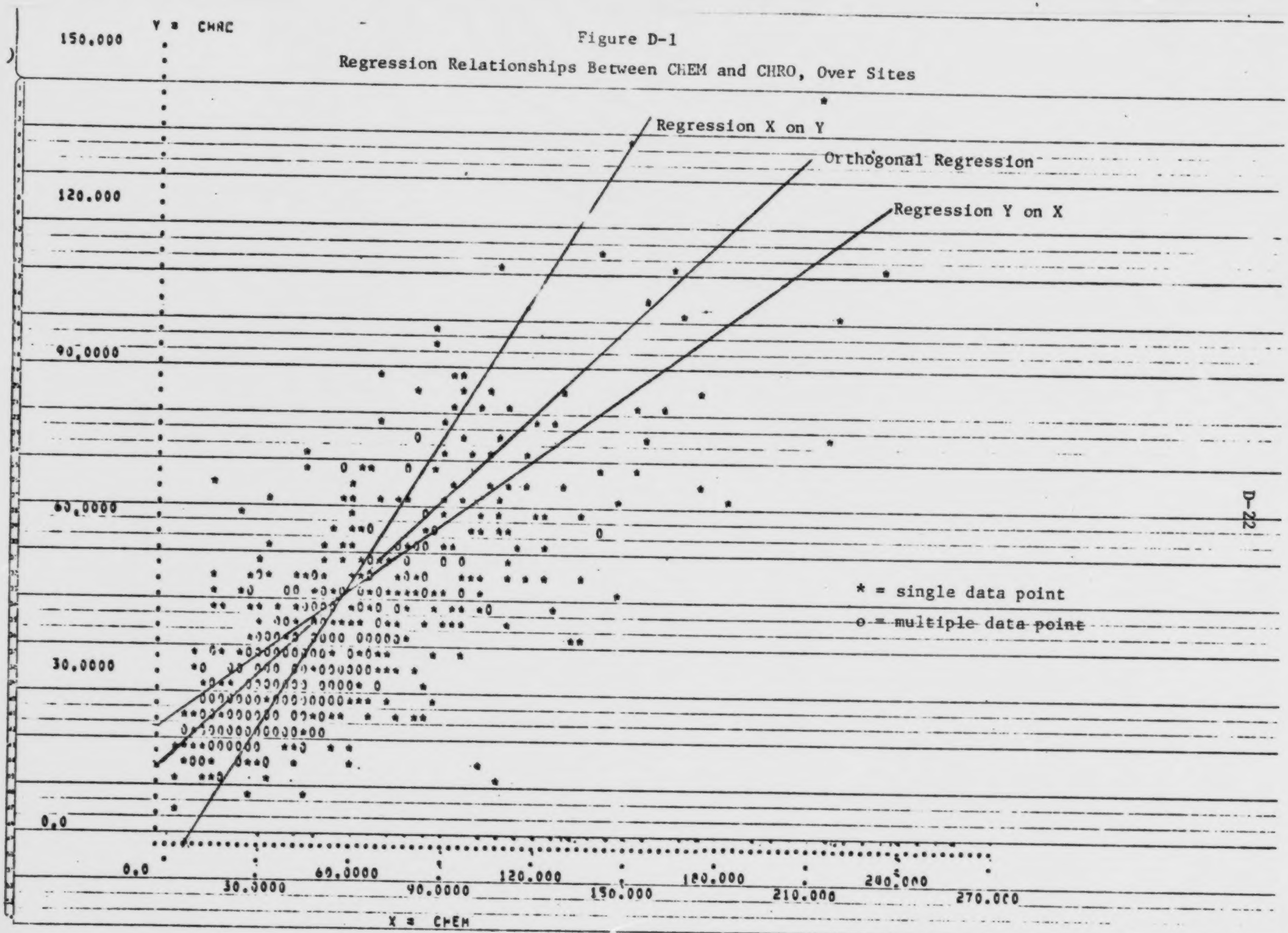
1/ Over sites 632, 633, 901, 902, 831, 832 and 841.

2/ The statistics given in the table can be used for confidence intervals on Y for a fixed X value.

3/ The orthogonal regression estimates of A and B are given so that they may be compared with the corresponding estimates from ordinary regression.

Figure D-1

Regression Relationships Between CHEM and CHRO, Over Sites



# APPENDIX E. SAMPLE MEANS AND CORRELATIONS FOR TWO TIME PERIODS FOR THE DAILY DATA

The following two tables (E-1 and E-2) give the unpaired means and the correlations for the daily data for two different time periods: (i) July 1, 1972 through October 31, 1972 and (ii) November 1, 1972 through April 30, 1973. A detailed discussion of these two tables is given in Section 4.4.b.

## Table E-1

## Correlations Between Methods--Over Sites[1], After Removing Outliers for Two Time Periods

| | FRMF | TEAF | CHRF | CHRO | CHESSO | TGSO | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| FRMF | | .75 | .81 | .80 | .60 | .65 | .60 | .71 | .68 |
| TEAF | .84 | | .87 | .87 | .57 | .69 | .77 | .71 | .71 |
| CHRF | .75 | .84 | | .95 | .60 | .74 | .75 | .76 | .76 |
| CHRO | .78 | .85 | .92 | | .61 | .77 | .71 | .77 | .77 |
| CHESSO | .58 | .64 | .62 | .57 | | .40 | .30 | .53 | .52 |
| TGSO | .80 | .90 | .94 | .90 | .67 | | .65 | .59 | .58 |
| TECH | .55 | .68 | .66 | .65 | .30 | .55 | | .51 | .66 |
| TEC4 | .75 | .82 | .73 | .78 | .74 | .87 | .67 | | .82 |
| CHEM | .72 | .78 | .75 | .74 | .66 | .84 | .65 | .83 | |

July 1, 1972 - October 31, 1972

November 1, 1972 - April 30, 1973

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[1] TECH in 632 and 633 only, other methods from sites 632, 633, 901, 902, 831, 832 and 841.

Table E-2

Means of Daily Measurements (Unpaired) by Method and Site

for Two Time Periods--After Removing Outliers

| | Time[1] Period | Site[2] | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 632 | 633 | 901 | 902 | 832 | 841 | 832D[3] |
| FRMF | I | 50.2 | 49.0 | 92.7 | 61.2 | 91.1 | 88.1 | 121.6 |
| | II | 59.9 | 56.2 | 88.1 | 80.9 | 125.5 | 72.7 | 110.0 |
| TEAF | I | 26.7 | 27.6 | 44.2 | 31.2 | 40.0 | 56.6 | 56.5 |
| | II | 29.2 | 23.8 | 42.6 | 38.3 | 60.6 | 38.9 | 66.1 |
| CHRF | I | 29.6 | 32.4 | 59.5 | 36.3 | 50.2 | 67.0 | 68.9 |
| | II | 37.8 | 34.4 | 57.9 | 49.1 | 76.4 | 51.3 | 81.9 |
| CHRO | I | 30.1 | 31.3 | 56.1 | 35.7 | 48.4 | 67.3 | 68.7 |
| | II | 37.3 | 32.9 | 54.2 | 46.5 | 73.1 | 51.2 | 74.0 |
| CHESSO | I | 31.4 | 32.1 | 64.8 | 44.4 | 57.1 | 67.4 | 84.3 |
| | II | 34.4 | 34.4 | 76.3 | 66.0 | 89.6 | 62.9 | 85.7 |
| TGSO | I | 34.0 | 41.1 | 58.4 | 40.9 | 49.6 | 69.9 | 68.0 |
| | II | 23.6 | 23.6 | 33.9 | 27.4 | 60.7 | 35.3 | 63.2 |
| TECH | I | 52.9 | 63.9 | * | * | * | * | * |
| | II | 51.9 | 59.4 | * | * | * | * | * |
| TEC4 | I | 53.1 | 43.9 | * | 47.9 | 96.8 | 104.7 | * |
| | II | 40.0 | 38.1 | 63.4 | 43.8 | 100.4 | 73.3 | 90.0 |
| CHEM | I | 44.1 | 52.6 | * | 46.3 | 84.7 | 87.9 | * |
| | II | 41.0 | 33.8 | 78.1 | 43.8 | 84.3 | 86.5 | 100.9 |

[1] Time Period I = 7/1/72 - 10/31/72, Time Period II = 11/1/72 - 4/30/73.

[2] Site 831 is excluded since instruments at this station were moved to Site 832 in October, 1972.

[3] The July-October period had approximately 20 observations per method in Site 832D.

* No data.

# APPENDIX F. SUMMARY STATISTICS FOR THE HOURLY DATA

This appendix contains detailed summary statistics and plots based on the paired hourly data for the TECH, TEC4, and CHEM. Table F-1 shows the hourly sample sizes, the paired means and standard deviations, and the correlations and ratios of means--for each pair of methods by site and hour of the day. The means shown in this table are plotted over hour-of-day in Figures F-1 through F-11. The pertinent discussion is given in Section 4.5.

The results shown in this appendix are for descriptive purposes only. Their general use is not recommended (see Section 5.4).

Table F-1

## NO2 HOURLY DATA SUMMARY, PAIRED DATA

------------------ SITE=632 METH1=TECH METH2=CHEM ------------------

| HOUR | N | MEAN_M1 | MEAN_M2 | SD_M1 | SD_M2 | CCR | RATIO[2/] |
|---|---|---|---|---|---|---|---|
| 1[1/] | 114 | 55.8 | 47.9 | 36.2 | 33.3 | .668 | 1.164 |
| 2 | 115 | 53.7 | 45.5 | 44.7 | 37.5 | .547 | 1.182 |
| 3 | 115 | 46.7 | 39.9 | 34.7 | 29.4 | .686 | 1.172 |
| 4 | 116 | 41.8 | 37.1 | 34.8 | 29.4 | .723 | 1.127 |
| 5 | 116 | 39.9 | 35.9 | 31.1 | 26.6 | .621 | 1.110 |
| 6 | 115 | 41.4 | 35.1 | 30.8 | 24.7 | .621 | 1.180 |
| 7 | 115 | 40.9 | 38.0 | 27.3 | 24.6 | .482 | 1.078 |
| 8 | 116 | 49.5 | 45.1 | 43.5 | 31.6 | .511 | 1.096 |
| 9 | 113 | 52.0 | 49.2 | 49.9 | 41.0 | .775 | 1.057 |
| 10 | 105 | 56.5 | 56.3 | 71.8 | 73.1 | .553 | 1.003 |
| 11 | 90 | 54.3 | 48.0 | 63.6 | 53.0 | .429 | 1.131 |
| 12 | 82 | 49.6 | 39.6 | 52.4 | 36.7 | .406 | 1.252 |
| 13 | 76 | 45.0 | 36.6 | 35.8 | 25.5 | .593 | 1.230 |
| 14 | 87 | 34.6 | 30.5 | 27.5 | 19.2 | .703 | 1.135 |
| 15 | 102 | 29.9 | 33.0 | 22.7 | 39.7 | .285 | 0.905 |
| 16 | 97 | 32.0 | 36.0 | 24.1 | 35.5 | .325 | 0.889 |
| 17 | 98 | 37.0 | 37.4 | 26.5 | 27.4 | .633 | 0.990 |
| 18 | 103 | 47.6 | 47.5 | 30.8 | 31.7 | .674 | 1.002 |
| 19 | 108 | 63.4 | 54.4 | 36.4 | 31.5 | .740 | 1.166 |
| 20 | 107 | 69.0 | 56.9 | 34.2 | 26.9 | .650 | 1.214 |
| 21 | 111 | 66.9 | 55.0 | 38.8 | 26.3 | .708 | 1.215 |
| 22 | 110 | 64.2 | 52.2 | 36.3 | 24.8 | .638 | 1.230 |
| 23 | 113 | 59.5 | 48.8 | 33.6 | 26.5 | .519 | 1.218 |
| 24 | 115 | 56.2 | 47.7 | 32.7 | 27.7 | .606 | 1.177 |

------------------ SITE=632 METH1=TECH METH2=TEC4 ------------------

| HOUR | N | MEAN_M1 | MEAN_M2 | SD_M1 | SD_M2 | CCR | RATIO |
|---|---|---|---|---|---|---|---|
| 1 | 122 | 64.3 | 56.8 | 36.2 | 33.9 | .655 | 1.132 |
| 2 | 123 | 60.5 | 51.8 | 43.0 | 33.8 | .566 | 1.167 |
| 3 | 123 | 55.0 | 50.3 | 38.9 | 40.2 | .682 | 1.094 |
| 4 | 121 | 49.2 | 45.7 | 36.5 | 35.6 | .689 | 1.075 |
| 5 | 123 | 48.5 | 44.4 | 37.0 | 34.6 | .763 | 1.091 |
| 6 | 120 | 51.4 | 46.4 | 52.3 | 46.7 | .844 | 1.107 |
| 7 | 120 | 47.8 | 44.6 | 35.4 | 32.3 | .700 | 1.073 |
| 8 | 122 | 55.7 | 52.5 | 44.7 | 36.4 | .621 | 1.062 |
| 9 | 119 | 62.1 | 60.8 | 54.4 | 54.5 | .812 | 1.021 |
| 10 | 112 | 69.3 | 60.4 | 79.7 | 60.3 | .878 | 1.146 |
| 11 | 100 | 64.0 | 53.2 | 72.1 | 60.8 | .768 | 1.202 |
| 12 | 91 | 51.0 | 50.6 | 53.3 | 101.3 | .395 | 1.008 |
| 13 | 79 | 41.5 | 32.9 | 36.6 | 24.0 | .770 | 1.260 |
| 14 | 85 | 34.9 | 27.6 | 40.5 | 20.0 | .346 | 1.262 |
| 15 | 94 | 26.1 | 25.1 | 22.2 | 18.1 | .569 | 1.041 |
| 16 | 100 | 27.2 | 26.1 | 22.6 | 18.7 | .687 | 1.042 |
| 17 | 103 | 33.3 | 31.3 | 28.1 | 21.9 | .679 | 1.066 |
| 18 | 109 | 41.0 | 39.0 | 30.5 | 24.4 | .668 | 1.051 |
| 19 | 119 | 55.8 | 47.2 | 42.0 | 28.2 | .592 | 1.184 |
| 20 | 116 | 64.9 | 57.4 | 38.7 | 37.6 | .655 | 1.130 |
| 21 | 124 | 73.8 | 64.2 | 44.4 | 43.1 | .760 | 1.149 |
| 22 | 127 | 77.7 | 67.3 | 46.0 | 43.3 | .766 | 1.154 |
| 23 | 126 | 72.3 | 60.8 | 42.6 | 35.2 | .729 | 1.189 |
| 24 | 127 | 67.0 | 58.0 | 38.7 | 33.4 | .656 | 1.156 |

Table F-1 (Continued)

------------------ SITE=632 METH1=TECH METH2=CHEM ------------------

| HOUR | N | MEAN_M1 | MEAN_M2 | SD_M1 | SD_M2 | CCR | RATIO |
|---|---|---|---|---|---|---|---|
| 1 | 136 | 56.2 | 46.1 | 66.6 | 31.1 | .451 | 1.220 |
| 2 | 136 | 53.3 | 42.9 | 67.6 | 33.7 | .441 | 1.244 |
| 3 | 136 | 51.4 | 39.5 | 70.8 | 30.4 | .545 | 1.301 |
| 4 | 134 | 47.2 | 36.9 | 68.1 | 29.4 | .484 | 1.280 |
| 5 | 134 | 45.5 | 34.9 | 67.5 | 25.7 | .478 | 1.302 |
| 6 | 131 | 49.8 | 36.2 | 86.2 | 30.9 | .647 | 1.373 |
| 7 | 131 | 46.6 | 36.3 | 68.5 | 22.7 | .385 | 1.281 |
| 8 | 133 | 53.3 | 43.4 | 67.6 | 30.1 | .432 | 1.229 |
| 9 | 135 | 56.9 | 44.9 | 75.5 | 38.5 | .603 | 1.270 |
| 10 | 131 | 48.5 | 47.1 | 48.5 | 62.1 | .651 | 1.030 |
| 11 | 128 | 40.0 | 39.9 | 33.8 | 42.3 | .514 | 1.003 |
| 12 | 129 | 41.9 | 33.8 | 83.9 | 28.4 | .396 | 1.240 |
| 13 | 134 | 35.2 | 31.6 | 37.1 | 25.9 | .742 | 1.111 |
| 14 | 135 | 27.7 | 31.5 | 20.4 | 58.5 | .184 | 0.879 |
| 15 | 132 | 27.5 | 27.8 | 19.2 | 32.1 | .437 | 0.987 |
| 16 | 135 | 32.8 | 31.0 | 53.3 | 42.7 | .941 | 1.056 |
| 17 | 132 | 37.6 | 31.1 | 46.9 | 19.8 | .520 | 1.208 |
| 18 | 131 | 44.8 | 41.0 | 36.3 | 29.1 | .606 | 1.091 |
| 19 | 131 | 57.6 | 50.5 | 42.9 | 25.6 | .613 | 1.140 |
| 20 | 127 | 71.8 | 57.0 | 73.6 | 27.8 | .462 | 1.259 |
| 21 | 136 | 67.2 | 55.2 | 69.8 | 27.8 | .547 | 1.219 |
| 22 | 141 | 66.3 | 51.9 | 70.3 | 26.4 | .417 | 1.276 |
| 23 | 139 | 59.3 | 47.6 | 65.7 | 27.3 | .464 | 1.245 |
| 24 | 138 | 59.3 | 45.9 | 68.2 | 25.9 | .468 | 1.291 |

------------------ SITE=633 METH1=TECH METH2=CHEM ------------------

| HOUR | N | MEAN_M1 | MEAN_M2 | SD_M1 | SD_M2 | CCR | RATIO |
|---|---|---|---|---|---|---|---|
| 1 | 117 | 71.2 | 49.8 | 70.2 | 51.5 | .816 | 1.428 |
| 2 | 116 | 69.6 | 49.3 | 74.7 | 51.2 | .747 | 1.412 |
| 3 | 117 | 67.4 | 48.1 | 78.7 | 62.5 | .868 | 1.402 |
| 4 | 118 | 62.9 | 43.7 | 81.3 | 55.1 | .834 | 1.441 |
| 5 | 119 | 59.2 | 42.4 | 73.9 | 54.8 | .883 | 1.395 |
| 6 | 119 | 68.6 | 48.7 | 87.6 | 66.2 | .756 | 1.409 |
| 7 | 116 | 65.2 | 48.0 | 83.6 | 68.7 | .853 | 1.357 |
| 8 | 116 | 68.0 | 46.8 | 72.8 | 48.0 | .727 | 1.453 |
| 9 | 104 | 78.1 | 48.7 | 88.2 | 64.3 | .841 | 1.605 |
| 10 | 94 | 66.6 | 44.7 | 61.7 | 56.4 | .728 | 1.493 |
| 11 | 86 | 74.2 | 41.2 | 77.3 | 39.0 | .695 | 1.801 |
| 12 | 85 | 57.3 | 37.1 | 51.0 | 32.2 | .369 | 1.545 |
| 13 | 88 | 40.7 | 29.2 | 35.3 | 25.4 | .671 | 1.396 |
| 14 | 95 | 36.5 | 29.0 | 30.5 | 22.8 | .652 | 1.261 |
| 15 | 108 | 37.2 | 31.6 | 34.7 | 27.3 | .668 | 1.178 |
| 16 | 104 | 40.4 | 32.5 | 38.0 | 30.0 | .770 | 1.240 |
| 17 | 109 | 42.1 | 34.9 | 40.5 | 30.0 | .793 | 1.207 |
| 18 | 112 | 50.4 | 42.6 | 41.2 | 34.8 | .620 | 1.183 |
| 19 | 114 | 64.7 | 53.4 | 46.3 | 41.7 | .753 | 1.212 |
| 20 | 112 | 79.0 | 57.7 | 59.3 | 50.5 | .799 | 1.369 |
| 21 | 119 | 78.8 | 53.4 | 63.7 | 39.7 | .640 | 1.477 |
| 22 | 117 | 79.1 | 53.2 | 76.1 | 55.4 | .575 | 1.489 |
| 23 | 117 | 81.4 | 50.7 | 81.4 | 57.7 | .833 | 1.605 |
| 24 | 119 | 71.4 | 49.2 | 76.9 | 54.8 | .866 | 1.451 |

Table F-1 (Continued)

```
-----------  ---- SITE=633 METH1=TECH METH2=TEC4 -----------------

   HOUR      N     MEAN_M1    MEAN_M2    SD_M1     SD_M2     COR     RATIO

     1     126       76.8       49.9      73.8      42.7     .747    1.537
     2     121       72.3       44.6      74.8      44.2     .736    1.621
     3     122       65.4       43.2      69.9      41.2     .761    1.514
     4     121       63.4       44.2      78.9      61.3     .645    1.435
     5     123       64.3       38.1      84.8      41.0     .894    1.688
     6     122       69.7       41.1      88.8      38.6     .765    1.696
     7     122       69.7       40.9      85.9      34.1     .730    1.702
     8     121       68.1       40.7      72.7      27.3     .620    1.675
     9     106       71.4       48.0      59.2      33.7     .542    1.487
    10      90       75.9       46.4      69.5      47.1     .600    1.634
    11      89       81.9       49.0      86.2      50.6     .668    1.671
    12      83       59.9       35.2      54.3      24.9     .571    1.701
    13      90       43.7       29.0      33.9      22.2     .761    1.506
    14      94       35.5       26.2      31.2      18.8     .829    1.357
    15     103       35.5       24.8      30.9      19.1     .751    1.431
    16     102       38.5       27.0      38.8      22.9     .768    1.423
    17     114       39.5       27.6      40.9      18.6     .724    1.430
    18     117       46.1       32.9      41.8      20.5     .706    1.401
    19     119       58.6       39.9      39.9      26.5     .647    1.468
    20     120       72.6       46.0      57.6      28.0     .576    1.576
    21     125       81.9       56.0      61.3      41.4     .653    1.463
    22     124       90.1       59.6      79.2      61.9     .595    1.512
    23     121       86.2       50.9      79.6      36.4     .712    1.693
    24     125       72.6       45.9      70.1      33.9     .558    1.579

----------------- SITE=633 METH1=TEC4 METH2=CHEM -----------------

   HOUR      N     MEAN_M1    MEAN_M2    SD_M1     SD_M2     COR     RATIO

     1     144       42.8       43.9      34.0      48.2     .661    0.975
     2     139       40.4       41.2      34.9      44.3     .747    0.980
     3     140       39.2       39.5      36.9      50.6     .712    0.992
     4     139       37.1       37.4      42.2      50.4     .855    0.991
     5     143       33.8       36.3      29.0      49.3     .726    0.931
     6     141       37.5       41.6      33.9      61.6     .773    0.902
     7     140       36.7       40.5      32.8      63.7     .555    0.906
     8     141       39.1       40.9      27.0      45.5     .633    0.956
     9     133       42.5       40.0      27.1      31.9     .510    1.062
    10     131       39.2       46.5      26.3      56.7     .644    0.843
    11     133       35.6       36.7      33.9      34.9     .561    0.970
    12     136       29.6       31.5      20.4      27.7     .440    0.938
    13     139       27.1       24.8      19.9      19.5     .571    1.003
    14     136       27.4       26.3      23.1      20.3     .367    1.043
    15     135       27.0       28.2      25.9      24.3     .342    0.958
    16     132       28.8       28.1      31.6      26.5     .351    1.024
    17     134       31.3       31.0      43.1      32.6     .159    1.009
    18     135       35.7       35.3      45.4      29.5     .262    1.011
    19     141       40.9       45.2      25.9      35.5     .464    0.905
    20     135       46.0       49.4      26.5      44.3     .473    0.933
    21     142       51.2       49.3      40.0      34.9     .301    1.038
    22     143       51.2       50.7      41.3      51.5     .279    1.009
    23     137       47.1       45.9      34.8      46.5     .526    1.027
    24     142       42.8       44.8      31.4      47.9     .536    0.956
```

Table F-1 (Continued)

------------------ SITE=832 METH1=TEC4 METH2=CHEM ------------------

| HOUR | N | MEAN_M1 | MEAN_M2 | SD_M1 | SD_M2 | CCR | RATIO |
|---|---|---|---|---|---|---|---|
| 1 | 132 | 102.6 | 81.9 | 54.5 | 44.8 | .769 | 1.253 |
| 2 | 136 | 104.4 | 76.0 | 86.5 | 41.5 | .517 | 1.375 |
| 3 | 132 | 93.0 | 71.3 | 52.0 | 38.6 | .789 | 1.305 |
| 4 | 136 | 89.4 | 68.7 | 50.9 | 37.7 | .708 | 1.302 |
| 5 | 132 | 82.0 | 64.2 | 46.8 | 33.8 | .759 | 1.277 |
| 6 | 133 | 85.7 | 64.7 | 78.7 | 34.3 | .391 | 1.324 |
| 7 | 122 | 87.9 | 68.6 | 79.6 | 35.1 | .418 | 1.280 |
| 8 | 126 | 91.6 | 76.4 | 40.8 | 37.4 | .788 | 1.198 |
| 9 | 119 | 106.7 | 87.4 | 57.6 | 52.0 | .692 | 1.220 |
| 10 | 107 | 125.2 | 97.1 | 102.9 | 71.8 | .743 | 1.289 |
| 11 | 85 | 110.8 | 88.0 | 120.3 | 73.6 | .767 | 1.259 |
| 12 | 75 | 107.9 | 90.9 | 106.8 | 83.8 | .793 | 1.187 |
| 13 | 90 | 106.3 | 93.3 | 116.6 | 80.4 | .640 | 1.140 |
| 14 | 109 | 88.5 | 86.6 | 82.2 | 78.4 | .902 | 1.022 |
| 15 | 115 | 80.3 | 74.6 | 70.7 | 60.8 | .826 | 1.076 |
| 16 | 122 | 83.8 | 76.2 | 79.0 | 66.4 | .775 | 1.100 |
| 17 | 128 | 102.5 | 86.8 | 100.1 | 68.9 | .727 | 1.180 |
| 18 | 128 | 118.1 | 102.7 | 96.0 | 72.4 | .722 | 1.150 |
| 19 | 133 | 126.5 | 108.0 | 102.8 | 70.0 | .727 | 1.171 |
| 20 | 133 | 132.7 | 113.3 | 75.2 | 67.7 | .902 | 1.171 |
| 21 | 125 | 131.6 | 108.1 | 77.5 | 71.1 | .878 | 1.217 |
| 22 | 130 | 122.5 | 101.3 | 66.1 | 62.5 | .871 | 1.209 |
| 23 | 132 | 123.8 | 96.7 | 87.7 | 57.5 | .689 | 1.280 |
| 24 | 130 | 109.6 | 88.0 | 57.1 | 53.3 | .880 | 1.245 |

------------------ SITE=832D METH1=TEC4 METH2=CHEM ------------------

| HOUR | N | MEAN_M1 | MEAN_M2 | SD_M1 | SD_M2 | CCR | RATIO |
|---|---|---|---|---|---|---|---|
| 1 | 73 | 96.9 | 103.0 | 55.1 | 62.2 | .916 | .941 |
| 2 | 73 | 88.8 | 93.8 | 45.6 | 51.0 | .884 | .947 |
| 3 | 71 | 84.1 | 88.6 | 41.0 | 45.3 | .867 | .949 |
| 4 | 73 | 82.6 | 85.6 | 38.3 | 42.3 | .833 | .966 |
| 5 | 65 | 73.6 | 77.6 | 34.9 | 39.0 | .850 | .949 |
| 6 | 74 | 72.3 | 79.5 | 33.2 | 39.7 | .862 | .910 |
| 7 | 63 | 75.6 | 85.7 | 39.2 | 46.6 | .895 | .862 |
| 8 | 65 | 83.4 | 87.8 | 36.1 | 46.2 | .856 | .950 |
| 9 | 66 | 91.5 | 97.8 | 40.1 | 52.3 | .886 | .936 |
| 10 | 69 | 95.9 | 103.5 | 64.2 | 75.7 | .925 | .926 |
| 11 | 52 | 89.5 | 104.1 | 80.3 | 99.6 | .960 | .860 |
| 12 | 40 | 86.0 | 100.7 | 95.9 | 108.6 | .986 | .854 |
| 13 | 46 | 91.8 | 105.9 | 96.9 | 109.1 | .962 | .867 |
| 14 | 58 | 71.9 | 86.1 | 70.4 | 81.0 | .960 | .834 |
| 15 | 66 | 75.0 | 85.8 | 79.2 | 84.3 | .937 | .874 |
| 16 | 64 | 79.7 | 93.0 | 84.3 | 98.1 | .969 | .858 |
| 17 | 77 | 101.5 | 117.6 | 104.1 | 117.3 | .971 | .863 |
| 18 | 72 | 120.7 | 132.7 | 106.2 | 113.2 | .961 | .910 |
| 19 | 77 | 125.7 | 136.3 | 95.9 | 106.5 | .955 | .922 |
| 20 | 71 | 126.7 | 139.5 | 80.2 | 94.7 | .952 | .908 |
| 21 | 69 | 126.4 | 137.0 | 82.6 | 96.8 | .954 | .923 |
| 22 | 69 | 115.7 | 122.3 | 68.8 | 79.3 | .910 | .946 |
| 23 | 66 | 111.0 | 116.3 | 66.9 | 79.2 | .941 | .939 |
| 24 | 69 | 101.7 | 110.1 | 63.7 | 74.3 | .942 | .923 |

Table F-1 (Continued)

```
-------------- --- SITE=641 METH1=TEC4 METH2=CHEM -------------------

 HOUR     N     MEAN_M1     MEAN_M2     SD_M1     SD_M2      CCR     RATIO

    1   103       106.1        95.3      55.2      49.0     .797     1.114
    2    98        97.7        86.1      50.4      45.5     .761     1.134
    3   103        89.9        78.3      59.4      48.9     .795     1.149
    4    98        88.1        76.9      54.1      45.4     .777     1.145
    5    99        77.7        69.3      48.8      43.9     .790     1.121
    6    90        76.0        67.8      48.2      42.4     .862     1.121
    7    76        72.3        67.6      50.7      43.7     .880     1.070
    8    83        76.6        69.7      52.1      42.8     .803     1.099
    9    79        99.3        84.8      97.9      51.4     .384     1.170
   10    66       116.6       104.7     110.0      64.4     .383     1.114
   11    70       100.9        95.2      86.5      53.1     .344     1.060
   12    77       105.4        99.5     123.4      64.2     .341     1.059
   13    83        84.8        93.5     106.8      55.0     .554     0.907
   14.   60        76.6        90.9     101.7      52.7     .474     0.842
   15    89        75.2        96.2      90.1      53.9     .437     0.782
   16    92        73.3        99.9      74.1      60.2     .506     0.733
   17    92        88.1       108.1      75.9      73.2     .490     0.815
   18    99       102.3       112.9      78.7      65.2     .467     0.906
   19    98       124.8       116.8      99.3      55.6     .406     1.068
   20   100       140.3       123.5      97.9      59.3     .522     1.137
   21   103       142.4       120.4     102.8      59.3     .589     1.183
   22   101       139.1       115.2     106.6      57.9     .591     1.208
   23   105       129.7       109.0      98.4      55.5     .571     1.190
   24    97       122.2       101.9      94.2      49.8     .594     1.199

------------------ SITE=901 METH1=TEC4 METH2=CHEM -------------------

 HOUR     N     MEAN_M1     MEAN_M2     SD_M1     SD_M2      CCR     RATIO

    1    30        64.8        80.3      35.2      29.1     .863      .807
    2    30        62.9        77.9      35.0      29.4     .860      .807
    3    31        59.1        75.3      36.1      33.3     .872      .785
    4    31        57.5        72.5      36.2      33.8     .865      .794
    5    30        56.6        72.0      33.7      32.6     .833      .786
    6    31        65.3        69.7      63.2      26.9     .216      .937
    7    30        58.2        74.7      30.2      26.5     .750      .780
    8    30        61.7        77.1      31.2      29.0     .709      .800
    9    31        62.0        78.0      31.1      25.8     .706      .794
   10    30        60.8        81.8      29.0      22.9     .682      .743
   11    31        59.6        83.6      30.6      27.3     .678      .712
   12    31        60.5        83.2      32.2      26.8     .750      .727
   13    31        56.9        83.0      30.9      26.4     .698      .685
   14    37        54.7        82.2      29.2      24.6     .454      .665
   15    10        53.2        85.5      19.7      26.0     .772      .622
   16    32        58.9        83.8      86.7      41.1    -.006      .704
   17    46        60.5        93.6      29.3      41.1     .583      .647
   18    48        70.1        91.3      31.7      29.7     .749      .767
   19    42        70.1        90.3      28.9      27.2     .859      .776
   20    44        67.2        86.0      29.4      25.9     .878      .782
   21    39        65.6        87.7      37.6      33.7     .867      .748
   22    29        66.6        84.5      37.3      30.2     .866      .789
   23    29        68.1        87.2      40.4      30.7     .874      .782
   24    30        66.0        84.5      37.9      28.9     .855      .781
```

Table F-1 (Continued)

================== SITE=902 METH1=TEC4 METH2=CHEM ==================

| HOUR | N | MEAN_M1 | MEAN_M2 | SD_M1 | SD_M2 | COR | RATIO |
|---|---|---|---|---|---|---|---|
| 1 | 66 | 49.1 | 45.4 | 22.4 | 26.9 | .615 | 1.082 |
| 2 | 66 | 42.7 | 40.9 | 21.4 | 27.8 | .466 | 1.044 |
| 3 | 66 | 36.9 | 35.0 | 17.7 | 20.2 | .675 | 1.054 |
| 4 | 66 | 37.6 | 35.7 | 17.6 | 24.2 | .520 | 1.053 |
| 5 | 64 | 39.2 | 36.8 | 16.7 | 19.7 | .660 | 1.066 |
| 6 | 63 | 45.2 | 40.7 | 18.8 | 18.4 | .660 | 1.110 |
| 7 | 62 | 52.6 | 48.4 | 22.1 | 22.5 | .686 | 1.087 |
| 8 | 64 | 55.2 | 52.2 | 26.3 | 29.9 | .622 | 1.057 |
| 9 | 60 | 51.6 | 52.0 | 28.3 | 35.7 | .628 | 0.991 |
| 10 | 31 | 44.1 | 47.0 | 19.8 | 27.7 | .786 | 0.939 |
| 11 | 50 | 45.9 | 44.5 | 31.6 | 34.2 | .912 | 1.032 |
| 12 | 67 | 42.6 | 44.3 | 21.3 | 27.8 | .750 | 0.963 |
| 13 | 68 | 39.4 | 42.1 | 20.4 | 24.4 | .783 | 0.936 |
| 14 | 66 | 42.4 | 44.1 | 24.0 | 27.9 | .799 | 0.962 |
| 15 | 62 | 42.0 | 45.5 | 22.1 | 24.3 | .690 | 0.923 |
| 16 | 66 | 43.8 | 47.7 | 20.9 | 25.2 | .670 | 0.918 |
| 17 | 68 | 44.8 | 47.0 | 21.4 | 23.3 | .726 | 0.954 |
| 18 | 73 | 51.5 | 51.2 | 24.6 | 26.4 | .780 | 1.006 |
| 19 | 75 | 57.5 | 55.6 | 27.7 | 26.8 | .763 | 1.034 |
| 20 | 76 | 57.0 | 56.4 | 26.9 | 29.6 | .818 | 1.010 |
| 21 | 74 | 59.6 | 59.6 | 24.8 | 27.7 | .740 | 1.001 |
| 22 | 73 | 58.5 | 57.2 | 25.2 | 28.1 | .692 | 1.022 |
| 23 | 72 | 54.4 | 50.5 | 22.1 | 24.2 | .720 | 1.077 |
| 24 | 72 | 49.4 | 45.9 | 20.7 | 22.4 | .673 | 1.077 |

---

1/ 1 = midnight till 1 A.M., 2 = 1 A.M. - 2 A.M., etc.

2/ Ratio = $\frac{\text{MEAN\_M1}}{\text{MEAN\_M2}} = \frac{\text{Method 1 mean}}{\text{Method 2 mean}}$

Figure F-1

Diurnal Averages for CHEM and TEC4,

Site 632

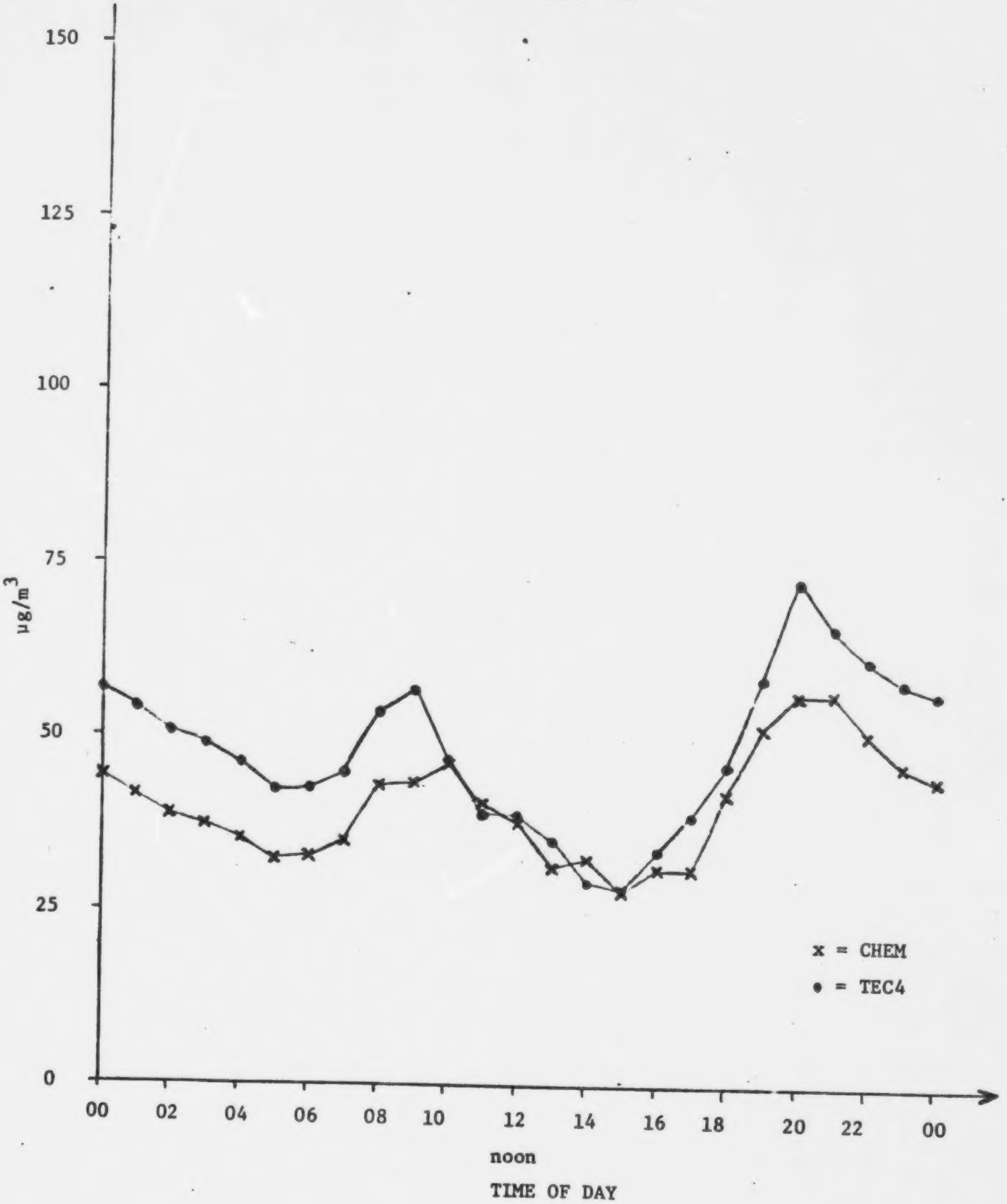
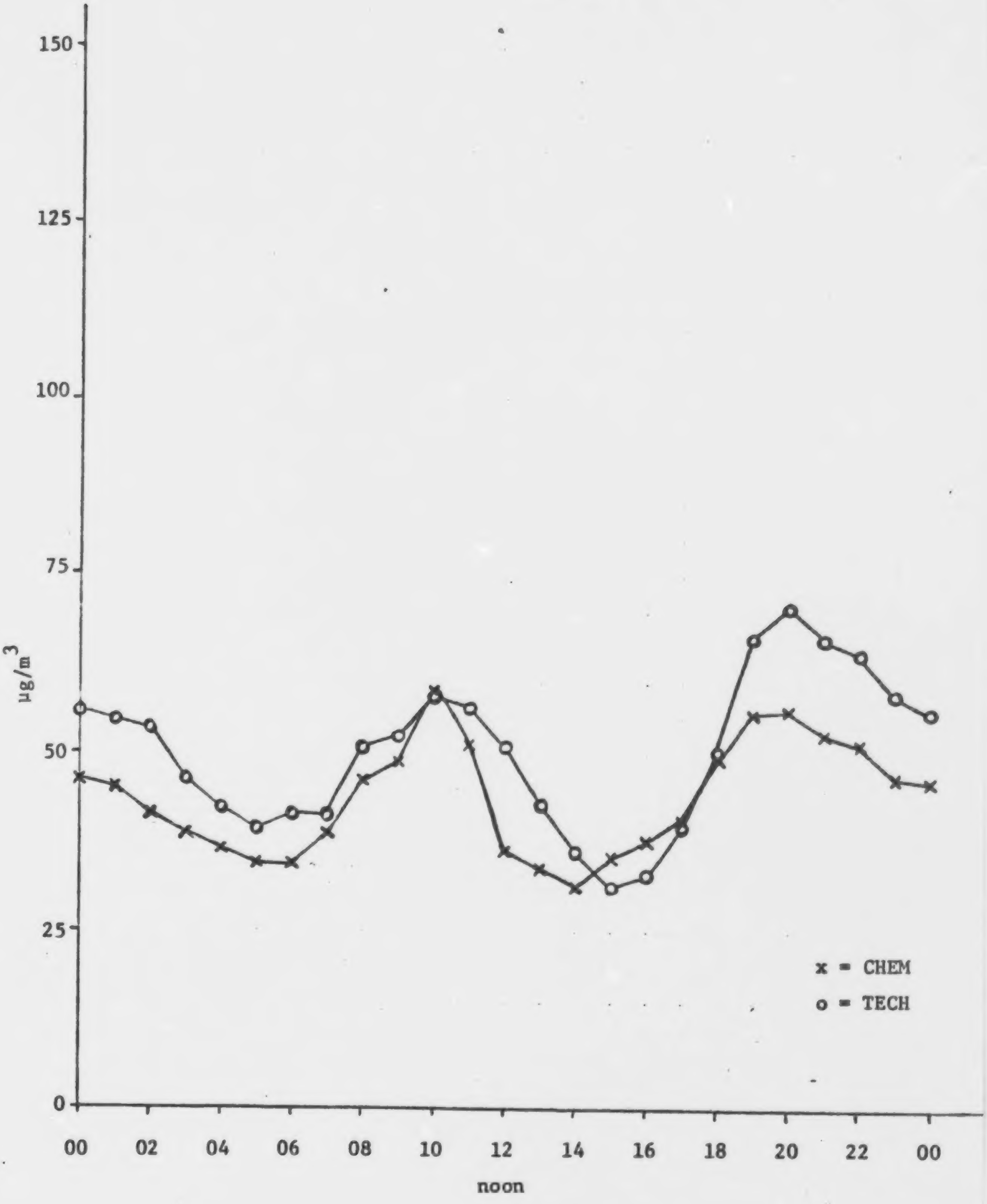


Figure F-2

Diurnal Averages for CHEM and TECH,

Site 632



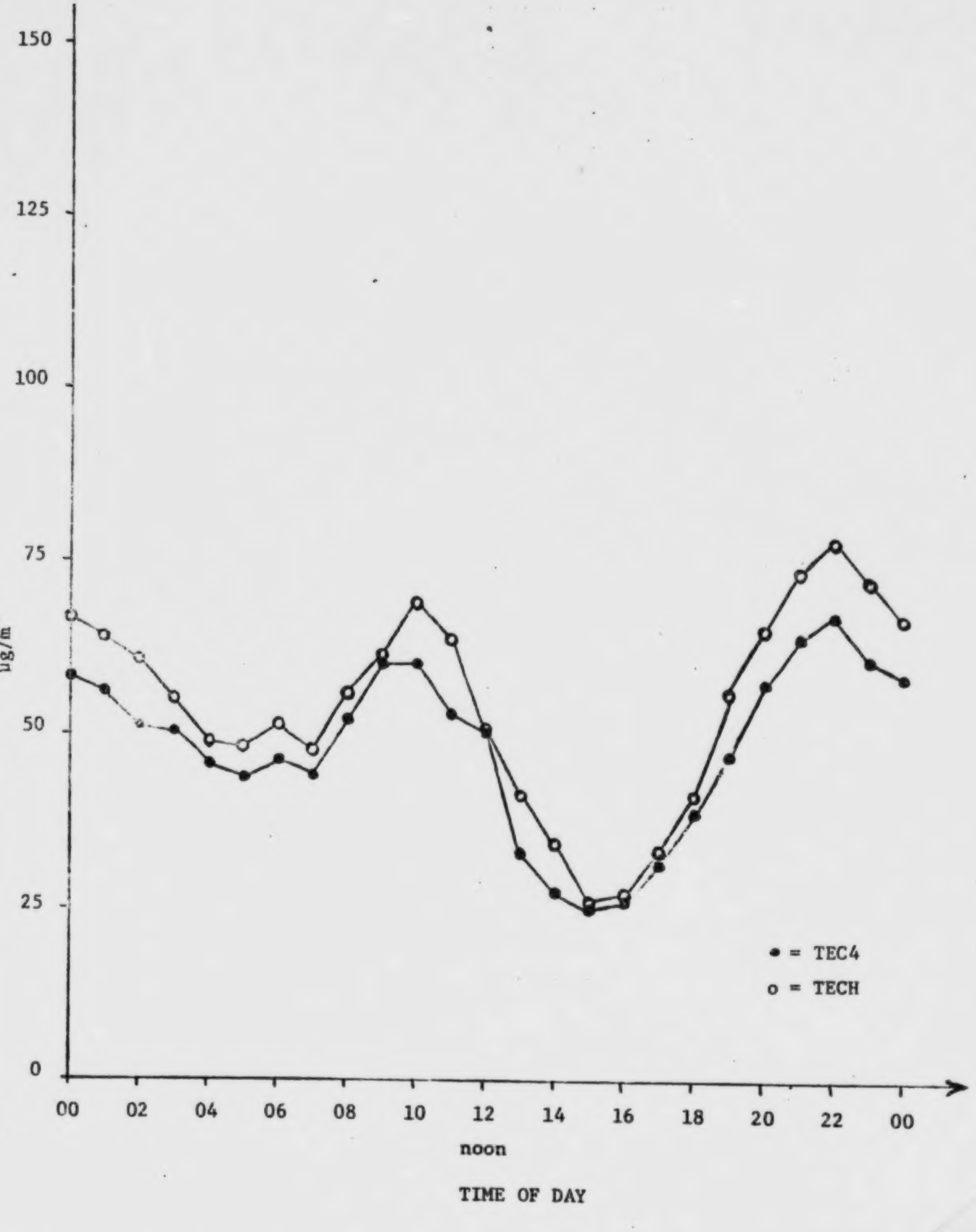


Figure F-3

Diurnal Averages for TEC4 and TECH,

Site 632

Figure F-4

Diurnal Averages for CHEM and TEC4,

Site 633

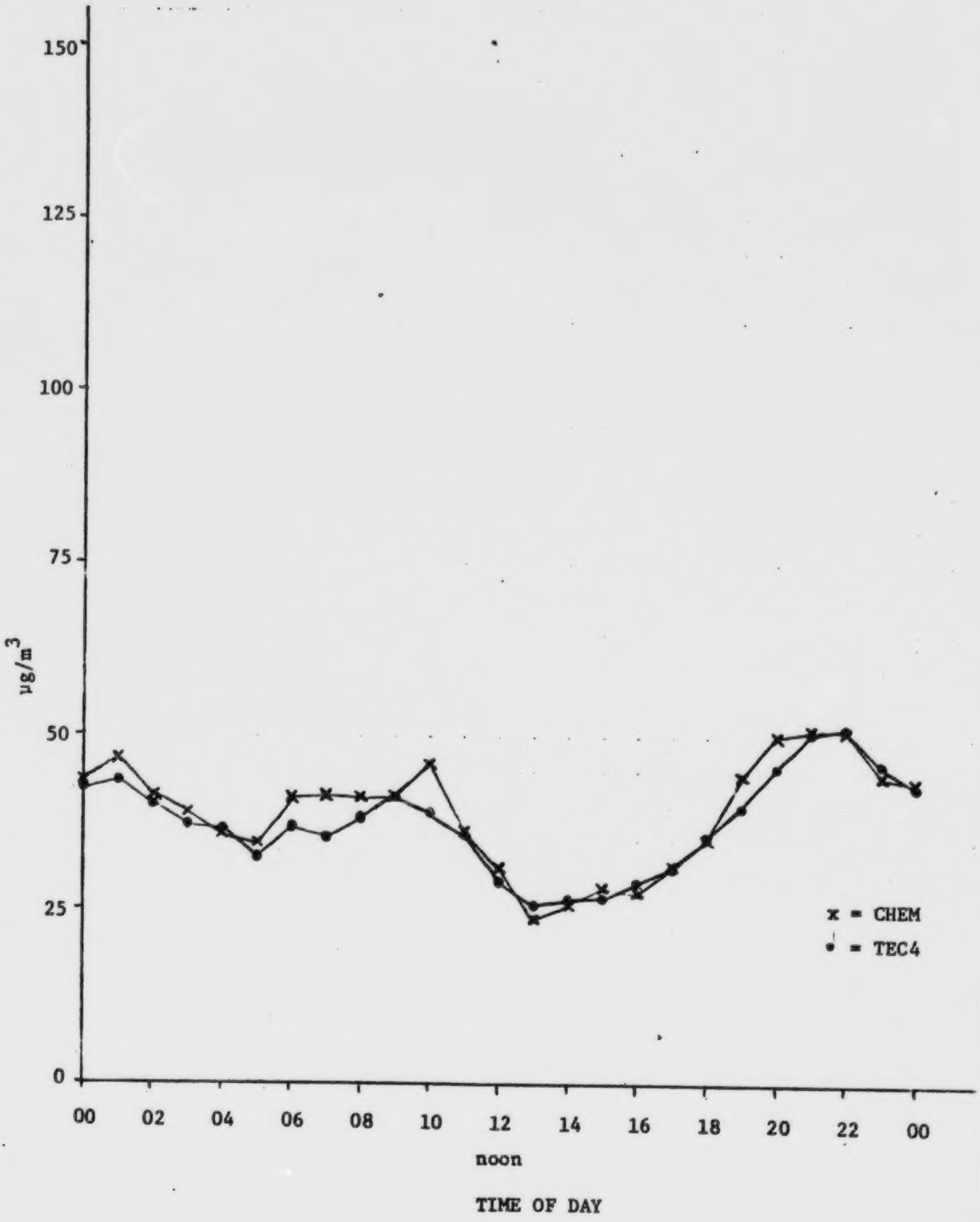


Figure F-5

Diurnal Averages for CHEM and TECH,

Site 633

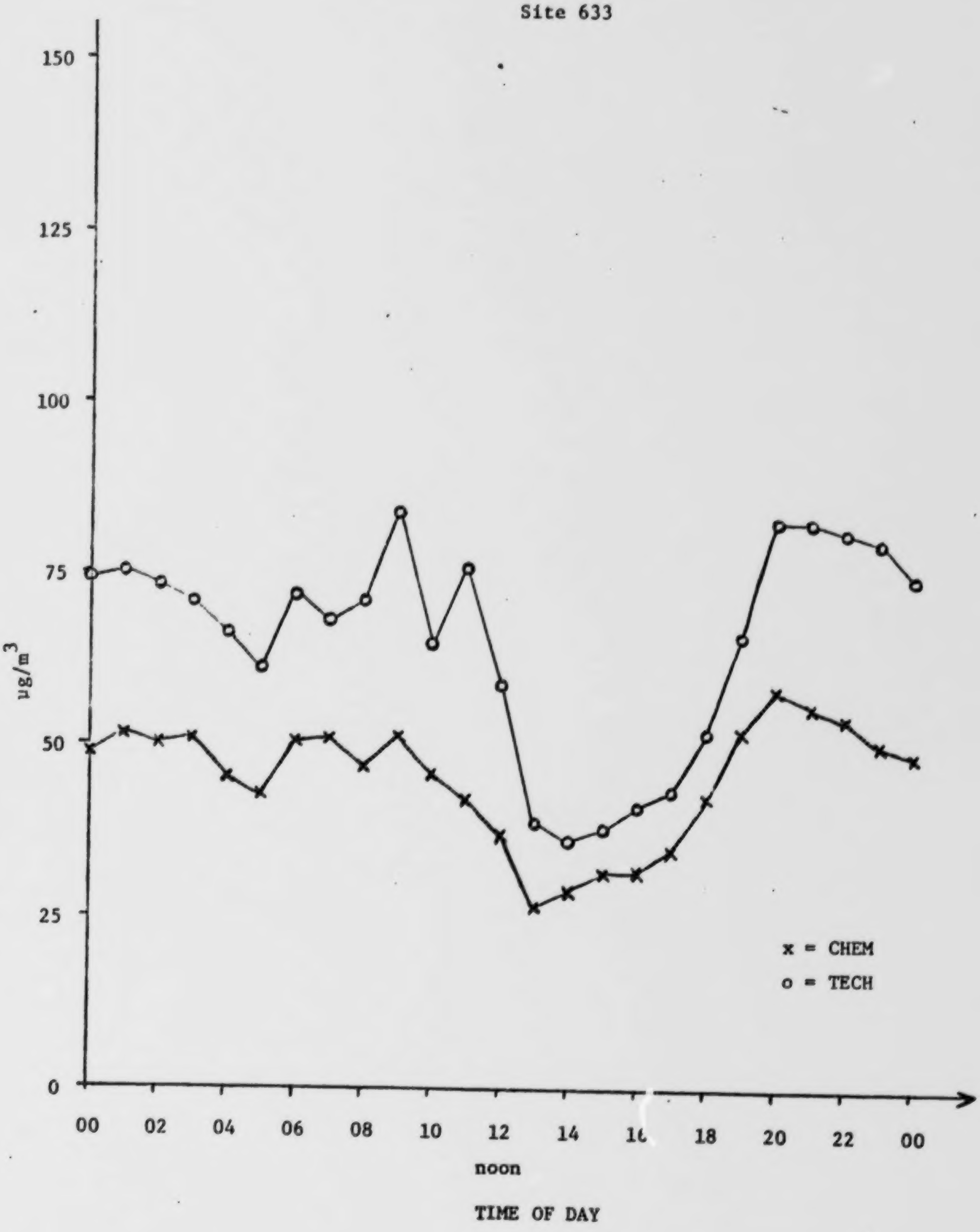


Figure F-6

Diurnal Averages for TEC4 and TECH,

Site 633

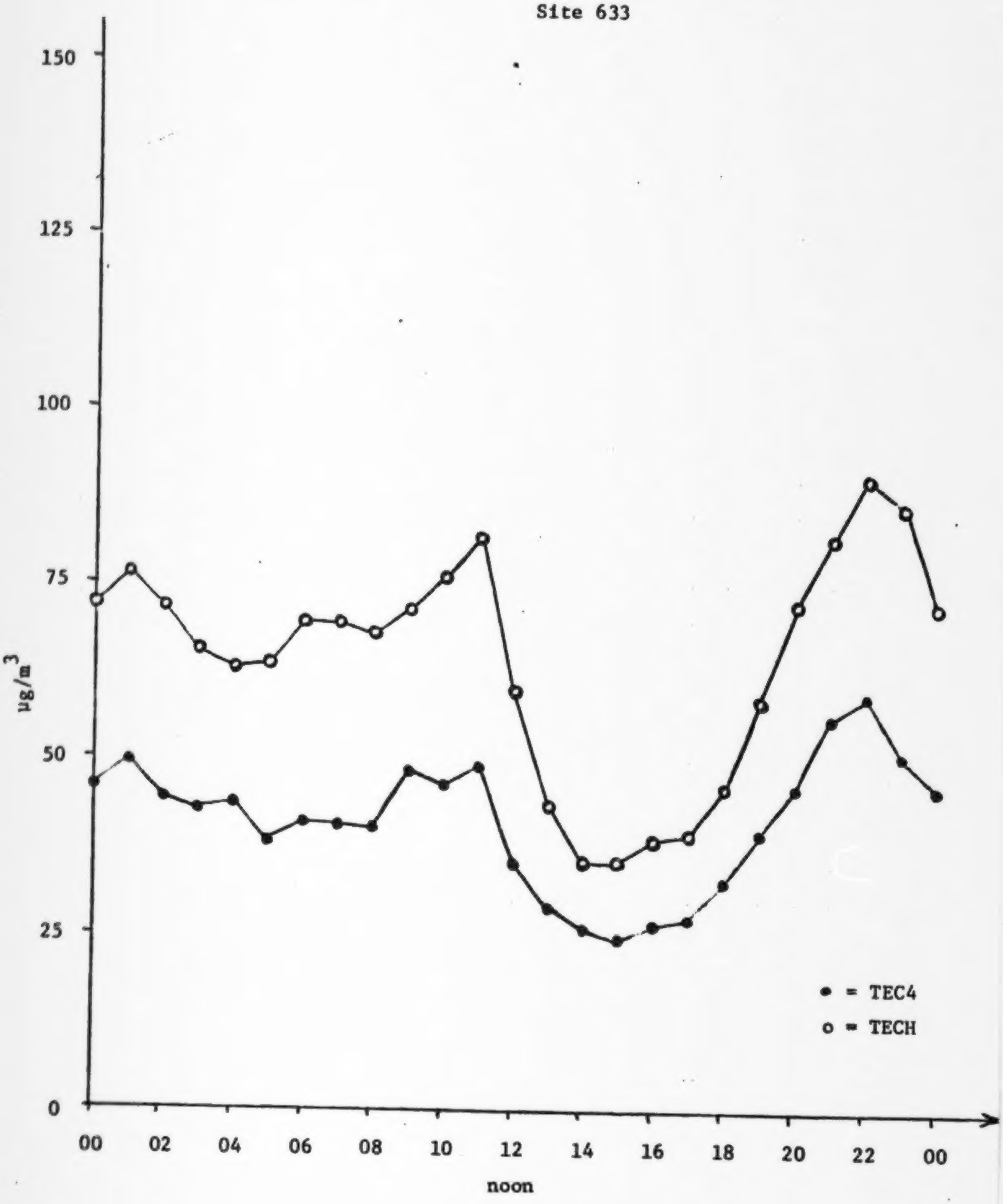


Figure F-7

Diurnal Averages for CHEM and TEC4,

Site 901

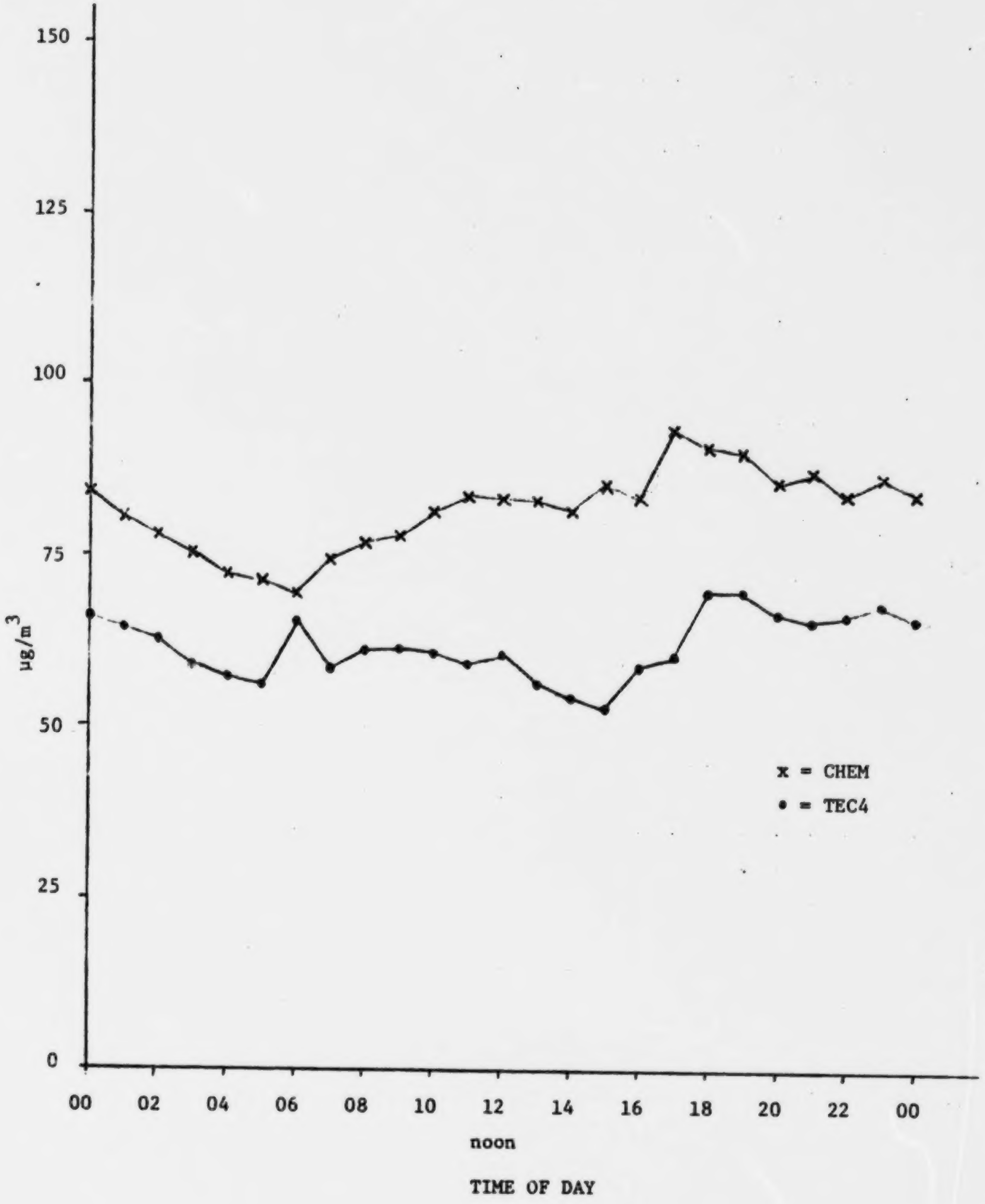


Figure F-8

Diurnal Averages for CHEM and TEC4,

Site 902

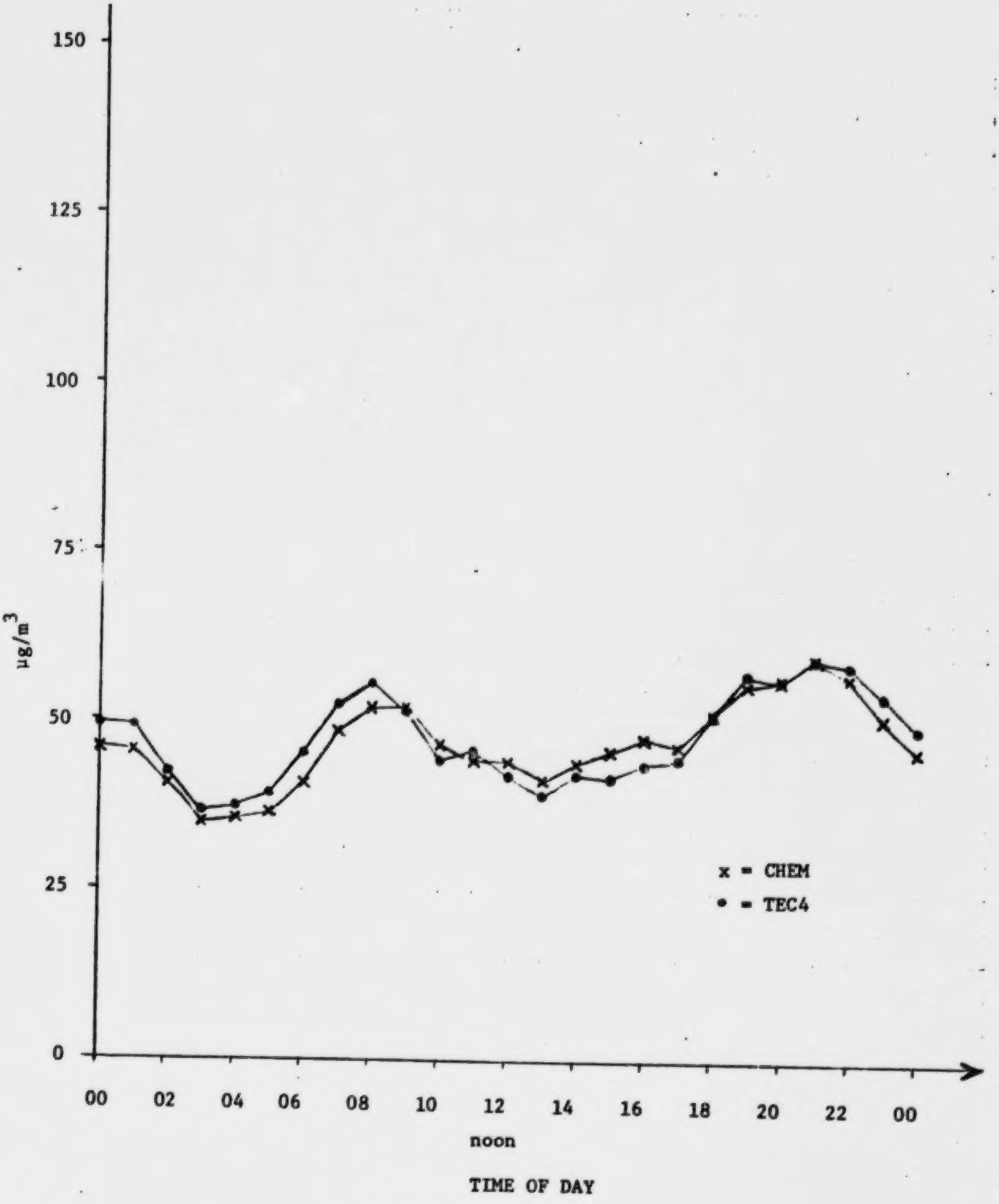


Figure F-9

Diurnal Averages for CHEM and TEC4,

Site 832

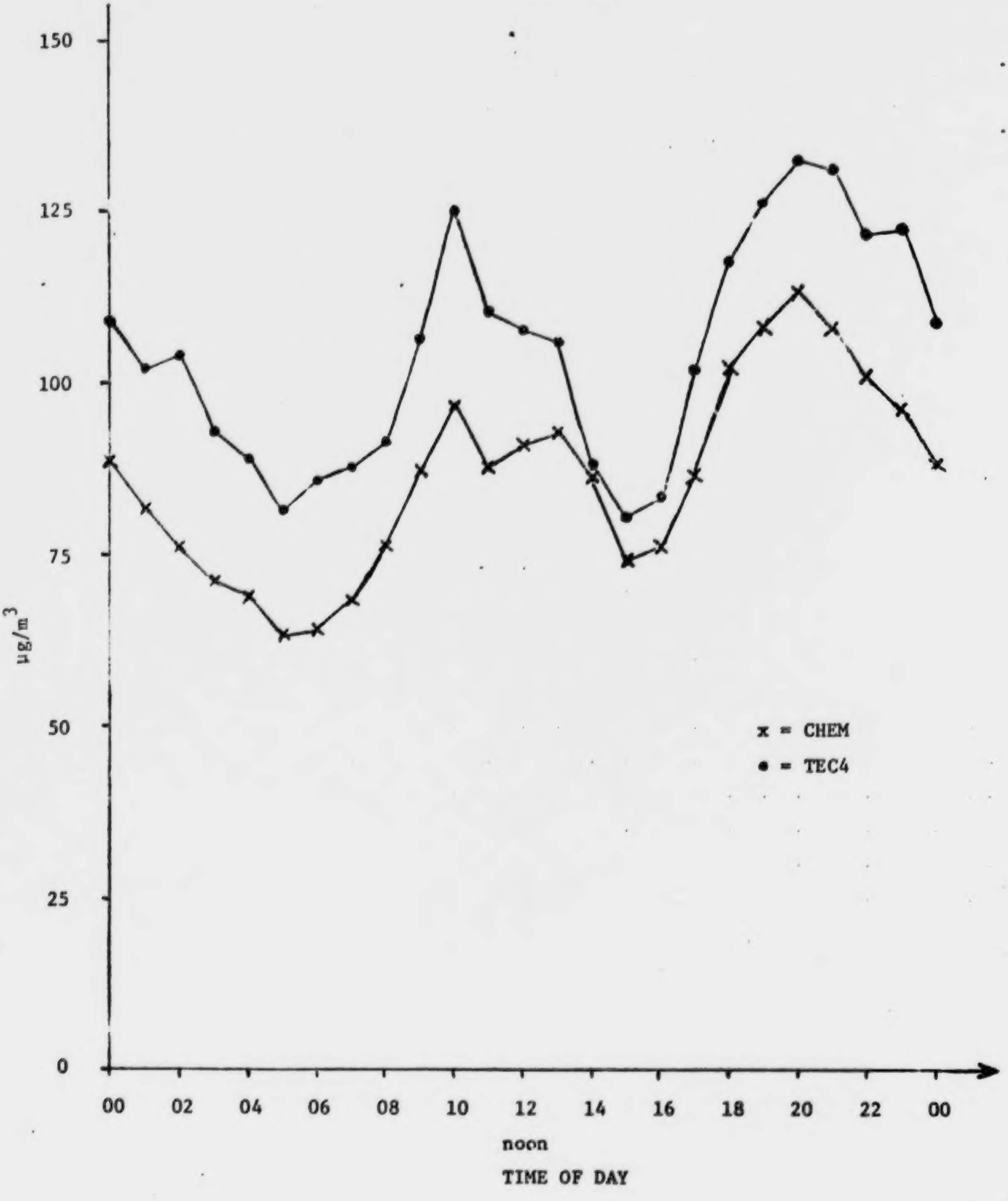


Figure F-10

Diurnal Averages for CHEM and TEC4,

Site 841

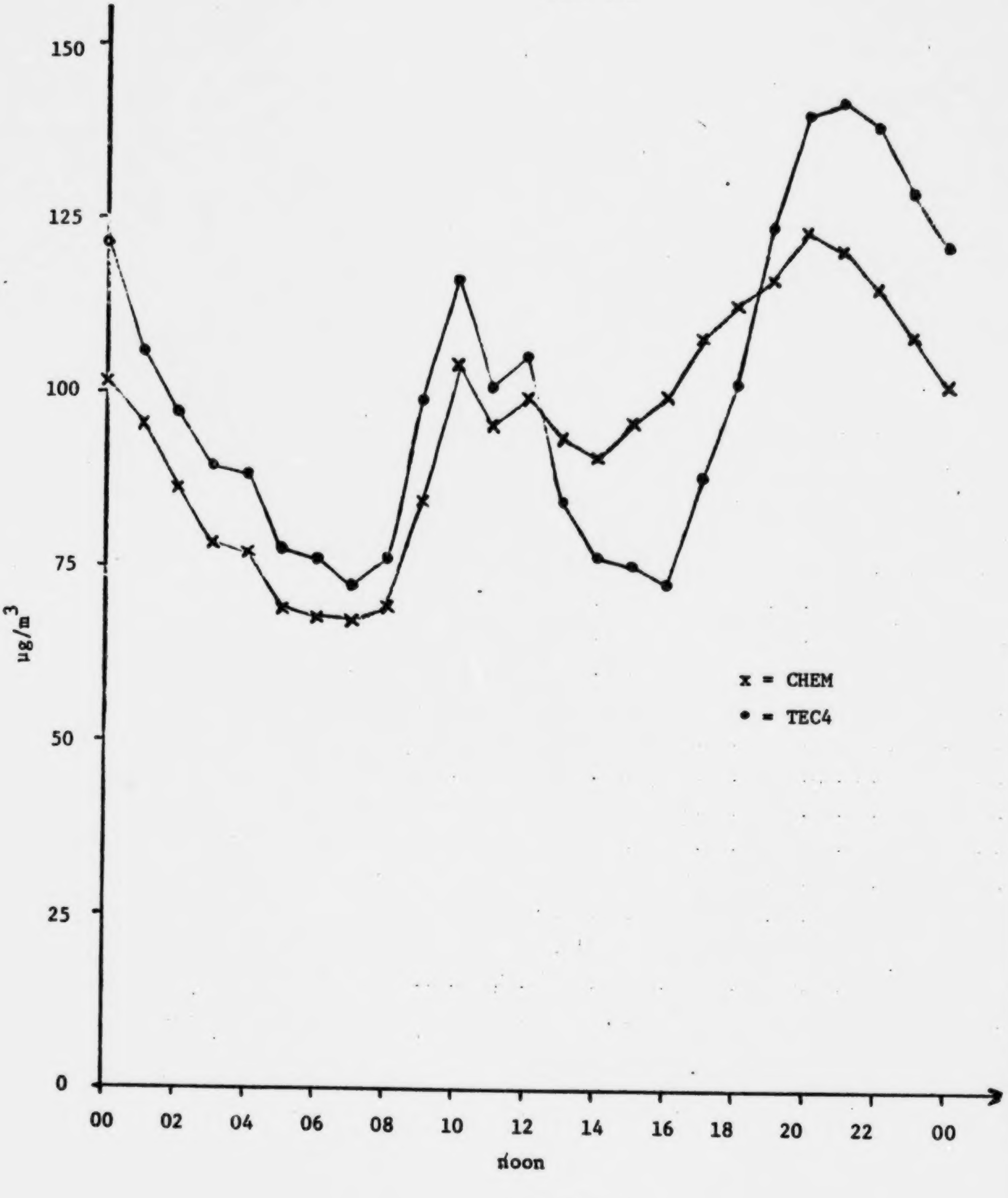
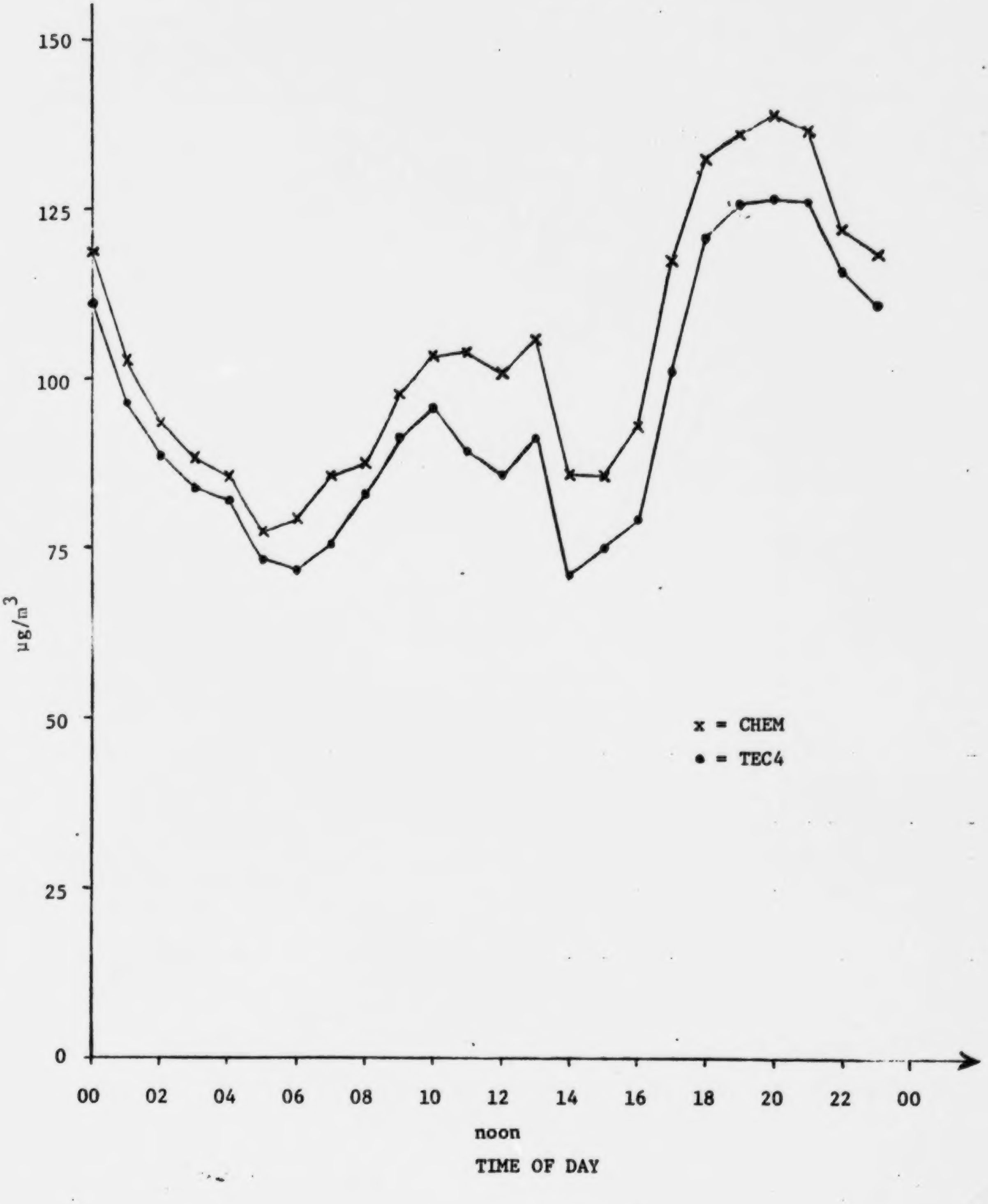


Figure F-11

Diurnal Averages for CHEM and TEC4,

Site 832D



## APPENDIX G. REFERENCES TO THE VALIDATION AND CALIBRATION PROCEDURES USED BY EPA

The following memorandum, provided by EPA, designates the EPA references describing the $NO_2$ validation and calibration procedures.

The general procedures to insure validity of Chess data are contained in the following:

1. CHESS - CHAMP Concepts, Methods and Equipment, T. D. English and F. B. Benson, 1/31/72.
2. Quality Control Systems for CHESS Program and CHESS - CHAMP Program, T. D. English and F. B. Benson, 1/31/72.
3. Computerized Flagging of Unusual CHAMP Data, T. D. English, 9/1/72.
4. Modification to Computerized Flagging of Unusual CHAMP Data, T. D. English, 9/6/72.
5. Constants for Flagging of Unusual CHAMP Data, T. D. English, 9/25/72.
6. Status of $NO_2$ Comparison Study, T. D. English, J. M. Sune and D. O. Hinton, 12/1/72.
7. Investigation of Bias in Garden Grove Duplicate $NO_2$ Measurements, J. M. Sune, 1/26/73.
8. Problems in NO Measurements, T. D. English, 3/31/72.
9. Discontinuation of NO Sampling, W. B. Steen and T. D. English, 4/19/72.
10. Data Validation, T. D. English, 11/7/72.

The memos "Data Validation" and "Quality Control Systems for the CHESS Program and the CHESS - CHAMP Program" contain the essence of the validation procedures.

## APPENDIX H. DAILY DATA LISTING BY SITE

On the following pages is a listing of the daily data (in $\mu g/m^3$) that RTI received from EPA in July, 1973. The listing is by method, site, and day and covers the time period July 1, 1972 to April 30, 1973. The site codes are the following:

City and Site Codes

| Code | Location |
|---|---|
| Chattanooga (6) | |
| (6) 32 | Briarwood Drive (Hamilton County) |
| (6) 33 | Hickory Valley Road (Hamilton County) |
| St. Louis (9) | |
| (9) 01 | South 12th Street (St. Louis County) |
| (9) 02 | South Hampton Street (St. Louis County) |
| California (8) | |
| (8) 31 | Anaheim |
| (8) 32 | Garden Grove |
| (8) 41 | Glendora |

Day 1 is July 1, 1972 and Day 305 is April 30, 1973. The method codes are given below:

| | Methods | | Assumed Collection Efficiency |
|---|---|---|---|
| (1) | Federal Reference Method | = FRMF | (35%) |
| (2) | Chattanooga Health Effects Study | = CHESSO | (35%) |
| (3) | Arsenite Method (straight tube impinger) | = CHRO | (85%) |
| (4) | Arsenite Method (fritted bubbler) | = CHRF | (85%) |
| (5) | Triethanolamine (fritted bubbler) | = TEAF | (100%) |
| (6) | Triethanolamine-Guaiacol-Sulfite[1] (straight tube impinger) | = TGSO | (100%) |
| (7) | Continuous Saltzman (Chattanooga) | = TECH | |
| (8) | Continuous Saltzman (Technicon Mark IV) | = TEC4 | |
| (9) | Chemiluminescent | = CHEM | |

In site 832 (Garden Grove) there are duplicate measurements (denoted by 832Dup) for the eight monitoring methods present in California starting on Day 99 (October 7, 1972).

In the listing

(i) "Daily" averages for the continuous monitoring methods are computed using a time period matching the times during which the bubbler methods were in operation.

(ii) * = value not shown because it was below instrument detection limits (there are eight of these cases).

(iii) At the present time no validated NO or ozone data has been given to RTI by EPA; therefore, these readings are not given here.

(iv) The data is listed to the nearest .1 of a μg/m$^3$. However, EPA personnel feel that the data is only accurate to the nearest μg/m$^3$. The reason that one decimal place was reported was due to the conversion from ppm to μg/m$^3$, Table H-1. NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

*************************************** SITE=632 ***************************************

| DAY | FRMF | TEAF | CHRF | CHRC | CHESSC | TGSC | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| 2 | | | | | | | 50.3 | | |
| 3 | | | | | | | 37.6 | | |
| 4 | | | | | | | 11.9 | | |
| 5 | | | | | | | 30.4 | | |
| 6 | | | | | | | 24.3 | | |
| 10 | | | | | | | 54.3 | | |
| 11 | | | | | | | 38.9 | | |
| 13 | | | | | | | 72.8 | | |
| 14 | | | | | | | 56.8 | | |
| 15 | | | | | | | 139.0 | | |
| 16 | | | | | | | 70.9 | | |
| 17 | | | | | | | 43.3 | | |
| 18 | | | | | | | 177.3 | | |
| 19 | | | | | | | 56.8 | | |
| 27 | | | | | 24.2 | | 45.6 | | |
| 28 | | | | | 26.1 | | 34.2 | | |
| 29 | 39.2 | 13.5 | 15.8 | 10.8 | 20.1 | | 44.5 | | |
| 30 | 20.9 | 9.9 | 11.3 | 12.0 | 7.4 | | | 17.8 | |
| 31 | 27.3 | 9.6 | 12.4 | 11.6 | 21.5 | | 41.7 | 31.0 | |
| 32 | 47.8 | 19.4 | 30.7 | 29.5 | 20.3 | | 66.9 | 42.9 | |
| 33 | 55.0 | 21.3 | 24.9 | 23.4 | 34.3 | | 55.4 | 30.7 | |
| 34 | 66.7 | 18.9 | 24.2 | 21.4 | 23.5 | | 58.5 | 40.2 | |
| 35 | 38.9 | | 23.1 | 24.4 | 25.4 | | 48.0 | 33.7 | |
| 36 | 38.0 | 15.0 | 21.5 | 16.9 | 20.4 | | 50.3 | 32.6 | |
| 37 | 43.6 | 22.0 | 25.6 | 25.3 | 34.2 | | 61.4 | 50.7 | |
| 38 | 31.0 | 12.3 | 20.7 | 18.5 | 9.6 | | 21.1 | 25.6 | |
| 39 | 36.9 | 15.5 | 20.7 | 22.7 | 39.6 | | | | |
| 40 | 65.4 | 25.0 | 35.5 | 34.5 | 13.2 | | 76.3 | 62.1 | |
| 41 | 84.1 | 35.2 | 41.8 | 43.8 | 38.5 | | 104.3 | 65.3 | |
| 42 | 66.0 | 25.7 | 38.0 | 35.9 | 29.3 | | 81.6 | 54.4 | |
| 43 | 23.1 | 19.9 | 18.6 | 14.4 | 30.3 | | 51.1 | 28.2 | |
| 44 | 34.1 | 22.9 | 15.9 | 9.6 | 19.8 | | 65.1 | 45.0 | |
| 45 | 21.9 | 11.0 | 14.2 | 10.8 | 25.7 | | 45.1 | 24.1 | |
| 46 | 36.8 | 19.8 | 13.5 | 14.7 | 32.2 | | | 46.5 | |
| 47 | 46.2 | 25.7 | 23.2 | 27.2 | 27.3 | | 57.9 | 81.2 | |
| 48 | 32.4 | 16.7 | 13.9 | 12.5 | 26.6 | | 23.5 | | |
| 49 | 33.8 | 22.0 | 25.5 | 28.8 | 17.9 | | | 54.2 | |
| 50 | 18.5 | 18.6 | 17.4 | 23.4 | 14.2 | | 50.1 | 40.2 | |
| 51 | 29.5 | 15.8 | 20.1 | 24.9 | 15.4 | | 52.5 | 34.3 | |
| 52 | 30.0 | 14.5 | 15.6 | 19.6 | 35.0 | | | | |
| 53 | 34.1 | 24.9 | 21.9 | 28.6 | 19.7 | | 72.4 | 41.9 | |
| 54 | 28.6 | 20.0 | 18.0 | 24.4 | 13.8 | | 48.4 | 41.0 | |
| 55 | 50.7 | 38.8 | 37.3 | 42.9 | 17.7 | | 70.0 | 71.6 | |
| 56 | 53.9 | 60.4 | 39.5 | 48.4 | 32.3 | | 135.7 | 100.9 | |
| 57 | 43.0 | 23.4 | 27.9 | 28.9 | 16.5 | | 44.0 | 35.6 | |
| 58 | 51.9 | 25.0 | 28.6 | 27.9 | 18.5 | | 51.7 | 43.9 | |
| 59 | 39.0 | 13.9 | 18.2 | 17.2 | 11.3 | | 31.5 | 24.0 | |
| 60 | 35.4 | 12.9 | 18.6 | 16.2 | 15.7 | | 34.5 | 19.8 | |
| 61 | 29.3 | 14.2 | 16.7 | 13.9 | 15.6 | | 16.8 | 16.2 | |
| 62 | 77.4 | 40.9 | 51.4 | 51.9 | 33.2 | | 87.9 | 69.7 | |
| 63 | 86.8 | 51.6 | 76.4 | 81.2 | 43.9 | | 96.9 | 94.1 | |
| 64 | 58.1 | 35.9 | 42.7 | 33.9 | 36.2 | | 99.8 | 71.5 | |
| 65 | 65.9 | 30.2 | 39.8 | 36.4 | 38.9 | | 96.8 | 71.3 | |

```
                    NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

---------------------------------------- SITE=632   ----------------------------------------
DAY    PRMF    TEAF    CMPF    CHRC   CHESBC    TGSC    TECH    TEC4    CHEM

 66    55.5    48.3    38.5    38.2    40.8             69.9    69.7
 67    22.0    13.2    16.7    16.2    23.6             30.7    19.6
 68    17.6    10.2    13.6    12.7    14.3             20.4    18.8
 69    27.9    21.2    22.8    21.5    46.7             40.2    36.7
 70    35.8    39.9    29.8    33.6    28.4             84.4    65.4
 71    31.8    25.0    25.4    27.1    26.1             47.4    43.1
 72    13.1     7.8     8.9     8.6    14.2
 73    37.3    25.1    23.1    24.2    23.3                     43.8
 74    97.8    40.3    42.6    43.6    42.3                     60.4
 75    58.9    28.7            37.8    42.6                     37.1
 76    50.6    39.3    39.4    40.9    46.2                     38.3
 77    28.2    18.6            19.2    28.6                     47.1
 78    46.0    30.7    33.6    34.8    42.1                     44.3
 79   107.4    64.3    75.9    64.8    63.6                    132.0    76.9
 80    32.9    24.2    26.9    24.5    56.0                             22.1
 81    59.5    36.7    24.0    25.1    74.7             26.0    30.8    38.1
 82    48.8    27.8    22.5    19.4    25.7             31.5    24.3    30.3
 83    42.3    29.2    28.6    29.6    32.0             51.1    35.9    19.8
 84    67.1    35.0    39.9    36.1    33.4             81.5    57.3    33.0
 85    69.4    39.7    48.[illegible]    42.6    38.7    34.7    39.8    55.8    69.6
 86    53.6    25.6    41.4    32.4    43.0    26.8    55.2    89.7    55.1
 87    63.2    45.5    47.4    53.8    42.8    36.9    53.7    73.8    71.5
 88    72.9    44.9    52.6    46.8    50.0    39.1    35.9    73.4    70.6
 89    44.0    15.3    28.1    24.7    39.9    28.3    67.8    36.9    36.6
 90    43.9    24.2    33.8    25.6    35.3    29.0            53.4    35.4
 91    55.0    27.1    42.1    33.3    35.2    27.3    20.9    50.5    46.2
 92    42.3    18.8    23.4    36.6    25.2    54.9    12.8    54.9    11.4
 93    22.8    13.0    13.3    21.9    14.3    29.3    26.2    53.7     9.8
 94    52.9    31.7    30.4    39.5    30.5    51.3    55.7    88.5    29.8
 95   101.4    53.8    54.8    64.1    39.8    93.5    88.6   102.5    54.0
 96    83.2    38.2    41.8    52.1    35.5    74.4    65.8    71.0    48.7
 97    43.9    17.0    18.8    27.3            41.6    34.9    53.2     8.4
 98    46.1    26.0    27.8    34.0            52.0    47.9    68.9    17.8
 99    39.7    11.4    15.4    18.5     4.7    28.7    16.0    54.4     3.9
100    35.5       *    22.7    24.0    51.3    32.4    16.2    60.2    13.0
101    57.7    33.0    40.8    42.7    26.5    54.8    83.8    96.3    48.2
102    50.7    16.1    23.5    19.5     9.1    36.1    35.7    64.2    20.0
103    75.8    29.3    40.6    36.6    26.6    63.7           101.9    59.8
104    66.6    28.2    37.8            42.1    54.0    64.2            66.4
105            40.2    44.1    42.9            19.7    68.3   130.1    73.4
106    67.6    38.5    32.5    34.1    77.1    33.9    65.8            53.4
107    60.1    24.4    29.1    26.0    41.6    24.5    36.1            46.9
108    76.1    36.8    33.9    34.4    51.3    28.4    64.3            56.0
109    64.0    29.9    30.6    31.9    46.7    26.9    60.1            57.0
110    64.3    34.8    32.1    31.3    40.5    28.4    36.0            56.5
111    57.6    42.7    34.9    29.5    30.8    25.7    38.6    18.8    53.0
112            20.6    18.4    16.8    16.6    15.0    35.9    32.8    34.4
113    84.0    42.2    62.6    57.2    48.9    34.1    38.8            64.4
114    72.5    44.7    55.2    63.8    39.1    45.7    34.0            81.2
115    52.3    22.9    24.4    33.5    61.6    22.4    41.4            42.6
116    32.9    14.5    15.3    24.1    60.9    14.1    36.6    36.3    38.8
117    36.3    13.9    12.8    25.5    16.6    11.0    11.5    15.1    21.6
118    52.1    18.4    24.7    38.4    31.7    19.5    42.5    53.7    38.9
```

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                 NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

******************************************* SITE=632 *******************************************

DAY    PRMF    TEAF    CHRF    CHRC   CHESSC    TGBC    TECH    TEC4    CHEM

119    63.0    28.2            36.6   52.[illegible]    10.0    46.6    80.8    65.1
120            24.1            19.8    30.8     16.1    51.9    70.5    55.0
121    88.3    22.1    20.5    21.5    21.8     11.9    33.1    49.4    38.3
122            19.4    22.4  [illegible]    23.4     13.7    29.5            40.4
123    71.4    41.8    45.6    39.8    22.5     36.3    64.5    59.6    73.0
124    67.3    27.1    32.6    30.6    47.7     23.8    30.4    60.1
125    62.2    26.9    29.8    27.1   126.5                     51.1    46.6
126    70.5    32.4    22.6    22.5   143.4     20.1    18.7    65.2    49.6
127                                    63.0                             58.7
128                                    18.4             16.3    32.0    31.2
129                                    23.9             54.0    85.7    73.6
130                                    78.2             26.9    50.4    50.0
131                                    26.2             15.8            37.0
132                                    20.6              9.4            25.0
133                                                     44.0           101.0
134    90.4    52.2    48.1    21.6             28.9    28.2            51.6
135    39.6    19.1    21.5    26.4    44.5     15.0    17.6            91.6
136    67.7    42.1    40.6    42.5    45.3     35.7    39.4    12.5    74.7
137    46.3    20.4    24.9    22.7    27.2     18.5    45.9    51.7    41.5
138    56.9    14.5    18.4    17.1    22.8     11.7    47.5           102.9
139    34.1    17.7    19.4    20.0             15.3                    61.2
140    55.1    27.6    32.8    29.8             22.1    62.0            51.3
141    53.1    28.1    30.7    23.2             21.7    56.4            43.3
142    67.1    40.3    46.1    42.9             36.2    61.5            63.4
143    60.4    24.6    30.4    27.2             21.5    57.7            47.9
144                                                                     38.5
145    67.2    27.3    32.2    29.1             25.6                    51.5
146                                                                     29.5
147                                                                     38.0
148   134.9    95.6   107.3    92.8             78.4                   126.6
149    49.7    22.1    30.2    28.5             20.5            23.6    44.8
150    38.1    21.7    27.3    23.4    54.6     19.7            22.8    42.1
151    35.5    24.7    27.8    23.5    31.3     18.0    62.7    37.8    44.7
152    22.7    10.4    13.4    10.0    97.9      7.3    49.2    12.4    29.0
153            31.4    36.2    31.5    33.8     26.9    77.5    43.2    51.5
154    40.3    22.4    27.1    22.7    23.9     20.0    68.5    33.0    40.2
155    76.8    42.8    44.4    47.2    86.1     35.3    57.6    53.9    59.3
156    80.6    49.0    58.1    54.8    61.6     45.6           521.1   149.3
157    74.5    44.2    53.2    42.7    58.0     33.0    83.4    49.2    55.7
158    99.3    26.8    36.6    32.9    50.6     26.7    47.0    33.4    47.1
159    49.9    18.9    24.8    21.5    24.2     17.1    26.2    34.9    38.5
160    26.6    10.8    18.5    15.4    21.6     12.1    33.9    14.2    26.2
161    93.4    34.0    38.6    33.8    42.5     26.3    69.2    44.7
162   146.7    55.9    36.7    57.1    68.2     21.2    34.7    34.5    31.6
163   307.2    33.7    30.4    38.5    37.3     18.4    49.0    29.7    24.9
164   101.6    40.6    24.6    39.8    34.6     18.5            27.1    31.1
165   140.2    53.0    38.6    32.9    55.0     31.7    70.6    48.9    42.8
166   144.8    41.5    28.7    38.0    31.2     15.0                    24.9
167            67.8    46.5    73.4    55.9     18.2    40.9    31.3    26.5
168   119.1    51.6    30.2    45.1    39.7     25.2    72.0    48.9    37.1
169    38.6    12.4    18.2    22.2    22.8     10.3    32.9    16.0    14.7
170    21.3    12.3    13.6    14.9    21.2      4.6    20.9     9.6     9.3
171    77.9    76.9    60.2    54.5    50.8     57.2   145.6    83.7    79.9
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                    NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

**************************************** SITE#632     *****************************************

DAY    PRMF    TEAF    CHRP    CHRC    CHESBC    TGBC    TECH    TEC4    CHPM

172   113.1    77.5    80.9    70.2     85.1     44.3   100.7    81.2    68.1
173    60.5    38.4    34.1    38.0     25.9     29.8    48.7    63.1    67.9
174    54.1    25.7    31.4    33.5     36.1     18.6    49.6            48.0
175    72.9    25.2    24.2     7.6  [illegible] 16.2    49.6            45.2
176    78.2    22.2    24.6    24.1     13.4     13.9    43.1            44.0
177                                                      52.7    32.4    33.2
178                                                      42.7    21.4    26.1
179                                                      51.3    26.9    28.4
180    41.6    17.1    23.4              9.3     12.6    18.8    24.8    21.9
181    73.1    36.4    43.6    38.6     51.3     33.2            51.4    50.9
182                                                     133.7    86.1    77.9
183                                    101.1             48.6            38.8
184    29.7    20.0    24.2    26.2     26.8     17.3    27.3            25.4
185    62.8    25.8    29.3    41.3     21.9     22.7    59.0    36.5    37.3
186    26.2                    23.1     14.4     12.4    27.3            21.7
187    64.1                    42.6     25.8     25.8    39.6    41.2    36.1
188    58.8    27.6    34.2    46.2     34.2     27.8    47.0    38.5    39.2
189    50.4    29.0    34.6    57.3     23.0     20.2                    35.2
190    31.9    13.6    21.6    31.5     28.3     14.9                    12.5
191                                                                      30.6
192                                                                      26.0
193                                                                      24.7
194    39.4    18.1    22.0    91.4     23.8     16.9    29.0            25.9
195    63.4    32.8    41.3    45.6     46.3     25.3    46.1            40.6
196    43.1    18.8    17.6    30.1     13.6     15.5    53.9            27.8
197    55.8    25.9    30.7    35.9     30.1     24.2    30.8            44.4
198    77.7    47.6    52.8    54.9     88.6     33.8            60.7    44.6
199    40.6    20.3    25.1    29.9     33.1     23.2    39.0    35.6    41.7
200    76.8    26.4    35.5    34.4     33.7     21.1    46.4    32.8    38.3
201    86.1    42.6    55.3    54.9     54.9     38.5    98.9    61.6    63.1
202    92.6    45.9    56.4    63.3     45.6     36.4   120.3    62.9    71.1
203    51.7    23.3    29.8    37.6     32.8     24.4    43.3    36.9    38.2
204    54.5    36.5    37.4    39.4     53.7     22.2    80.8    36.1    40.3
205    74.6    28.0    33.2    41.5     30.6     22.6    62.9    34.9    41.8
206    24.5    17.2            27.1     13.2     12.5    30.5            22.5
207    32.5    20.6    21.5    23.9     32.8     15.9    40.4            27.2
208     6.5    23.9    23.2    26.8     27.4     18.6    50.4    32.4    34.5
209    60.4    39.7    43.2    44.8     36.1     20.5    79.0    46.5    49.0
210                     4.0    58.9      8.5     26.4    83.4    51.4    49.5
211    46.9    25.5    40.1    32.1     26.9     26.4    58.4    35.7    42.0
212    54.2    27.8    48.4    31.9     30.7     29.7    68.0    40.1    41.6
213    36.3    18.0    27.3    20.2     22.7     19.5            25.0    26.5
214    38.5    20.1    32.6    23.9     83.0     20.0            24.3    27.6
215    64.0    14.7    49.9    43.1     25.9     35.8            70.3    50.3
216    32.0    20.2    28.4    21.8     24.7     21.8            24.9    24.1
217    38.9    15.7            23.5     24.6      4.4            34.8    31.8
218            14.3    20.5             21.2                     15.3    21.8
219                                     17.4                     33.6    31.3
220    89.8    36.0    41.1    41.6     32.9                     61.8    52.4
221    76.8    45.1    52.2    54.7     33.1                             63.7
222    42.1    25.8    29.4    28.1     37.5                     55.3    34.1
223    68.6    20.9    39.3    36.9     11.0                     47.8    43.9
224    30.2    13.1    12.9    11.4      6.8                             13.7
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NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

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***************************************** SITE=632   ******************************************

DAY    FRMP    TEAF    CHMF    CHMC    CHEBBC     TGSC   TECH   TECM    CHEM

225    30.8    11.1    35.6    31.5  [illegible]                          12.6
226            12.5    24.0          [illegible]                          16.9
227            40.2    97.1    55.3    37.3                               52.8
228    47.0    29.2   110.0    45.8    29.2                               45.8
229    71.0    32.5    60.6    55.9    28.4                               49.0
230    62.9    27.1    48.5    44.5    30.8                               44.1
231    29.8    13.1    28.5    25.9  [illegible]                          17.2
232    15.5    19.2    28.5    22.5  [illegible]                          15.8
233    75.0    30.2    40.0    40.9    46.6                       36.8    34.2
234    67.7    34.5    44.0    36.6    43.2                       46.3    45.6
235                    70.7    47.4    22.3                       59.6    53.9
236            23.5    35.8    27.9    60.9                       29.5    29.2
237    41.3    26.9    33.6    29.9    19.6                       27.9    24.2
238    65.0    27.6    40.2    38.5    35.8                       38.1    36.3
239   100.3    42.3    56.9    84.4    85.6                       67.1    59.9
240    52.7    36.3    66.5    49.9    42.3                       50.3    43.7
241    77.1    40.7    53.2    62.6    46.7                       61.8    57.1
242    43.2    21.3    39.3    38.9    24.2                               29.0
243    42.7    17.5    45.8  [illegible] 33.5                     17.7    29.2
244    60.4    34.9    66.1    57.2    36.5                               51.1
245    55.0    33.1    62.7    51.8    27.5                       59.7    52.1
246    88.0    26.9    91.6    77.2    21.4                       31.6    39.9
247    30.9     6.3    37.3    51.0    18.7                       44.1    38.7
248    59.7    33.5    78.7    86.1    27.5                               46.5
249    67.6    31.6            65.4    45.9                       44.6    30.2
250    42.1    14.8    44.0    43.1    34.0
251    53.9    22.2    59.2    53.5    14.9                       35.0
252    62.6    27.9    60.4    77.3    20.1
253    32.5    14.4    26.7    18.7    28.9                       23.0
254    14.7     7.8            12.9    20.1                       11.8
255    44.6    24.6    32.0    28.7                               34.3
256    62.1    42.7    49.8    43.6    37.6                       57.7
257    83.8    35.2    44.2    40.5    53.5                       55.8
258    27.2    12.1    18.8    19.3    19.7
259    40.6            19.6    22.0    30.9                       27.3
263    76.7    36.0    21.4    42.5    29.0                       52.5
264    44.1    15.7    22.8    25.2    15.5                       23.7
265    42.2    17.5    27.9    28.8    30.9
266    40.6    19.9    32.8    28.8    58.3                       42.8    28.4
267    75.5    29.1    56.0    47.9    39.2                       42.8    40.4
268    25.8     9.5    30.5    25.3    19.7                        8.1     9.2
269    53.4    13.3    46.8    32.9    25.4                       18.2    18.8
270    71.3    23.7    48.4    43.8    51.2                       35.4    33.6
271    59.3    28.7    55.5    47.8    28.4                       39.2    36.1
272    21.6    13.6    49.3    41.3    17.2                       15.8    16.7
273    71.3    22.8    50.6    30.5    20.4                       36.0    30.8
274    44.1    24.6    29.5    25.6    25.4                       32.2    29.3
275    66.9    20.0    27.1    26.1    24.8                       35.6    29.3
276    33.2            17.8    19.6    12.7                       19.9    18.6
277    55.0    32.0    45.4    37.1    17.9                               49.2
278    15.2    17.3    23.3    19.9    27.0                               23.5
279    16.1    18.6    26.8    25.3    29.7                               26.1
280    83.0    36.1    47.1    41.4    69.2                               46.9
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                         NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

   ------------------------------------------- SITE=632   -------------------------------------------

   DAY     FRMF      TEAF      CHRF      CHRC        CHEMSC     TGSC      TECH       TECA      CHEM

   281    153.1      76.8      79.6      64.9        38.9                            90.3      79.2
   282     85.2      23.7      25.3      24.0        22.7                            26.7      26.2
   283                                                                               38.1      37.2
   284                                                                               10.0      12.9
   285     76.6      44.1      37.5      [illegible] [illegible]                     42.9      35.4
   286    136.5      51.2      [illegible] [illegible] 29.3                          41.2      35.9
   287     63.1      33.9      [illegible] [illegible] 27.4
   289                                               44.9
   290                                               [illegible]
   291                                               [illegible]
   292                                               17.4
   293                                                7.2
   294                                               15.6
   295                                               27.4
   296                                               16.2
   297                                               18.1
   298                                               10.8
   299                                               20.1
   300                                               12.9
   301                                                8.3
   302                                                9.3
   303                                               22.6
   304                                               24.6
   305                                               58.8
   306                                               32.1
   307                                               23.6
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                 NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

 ---------------------------------------- SITE=633 ----------------------------------------

 DAY    FRMF    TEAF    CHRF    CHRC  CHESSC    TGBC    TECH    TEC4    CHEM
   9                                                    47.0
  10                                                    38.9
  11                                                    52.7
  12                                                    58.6
  13                                                    45.7
  15                                                   108.3
  16                                                   154.0
  17                                                    97.0
  23                                                            22.7
  24                                                            20.0
  26                                    23.2
  27                                    22.1
  28                                     6.1            35.4    20.9
  29    28.3     7.8     9.1    11.1    22.4            32.0    30.0
  30    17.1     6.2     7.4     9.8    17.4            19.7    14.8
  31    21.3     6.4    11.1     8.4    18.3            33.6    25.0
  32    21.8     6.5    10.6     8.9    25.7            41.8
  33    24.7     9.8    16.7    16.5    21.0            41.7
  34    47.5    16.1    21.3    19.5                    52.6
  35    24.4     9.7    15.9    14.7    18.9            33.1    24.2
  36    77.9    40.0    49.4    48.9                   111.0
  37    35.5    14.3    17.9    16.2    12.7                    33.6
  38    20.5     9.9    13.2    16.7    18.4            27.9    18.9
  39    52.6    21.3    28.1    32.6    41.9            61.7
  40    47.3    16.9    26.1    28.0     9.5                    41.2
  41    46.4    17.8    21.5    20.8    24.7                    26.9
  42    96.8    41.9    53.3    35.2    40.7           125.8    96.5
  43   118.3    12.8    15.8    11.2    33.5            41.2    23.3
  44    28.6    22.1    25.4    17.2                    68.9    61.3
  45    69.9    52.2    49.3    48.8    30.8           116.5    87.6
  46    27.4    11.8    24.0    24.2    31.1
  47    45.4    44.9    42.8    35.2    19.9            84.2    76.3
  48    20.3    10.9    15.5     7.9    13.8            26.4
  49    36.2    39.1    25.1    26.9    17.0            67.0    45.2
  50    21.2    24.8    20.0    25.6    18.6            45.1    46.7
  51    53.2    37.9    53.6    45.9    33.3            83.4
  52    37.0    14.3    17.9    20.0    32.2                    38.3
  53    19.7    15.4    14.8    18.0    11.3            33.6    27.6
  54    15.4     7.6    14.2    17.5    10.4                    51.4
  55    16.5    27.5    26.9    31.9    11.8            71.4    46.2
  56    15.8    15.3    19.3    22.1    32.5            69.4    37.7
  57    48.7    17.8    20.9    21.1    26.8            53.5    24.1
  58    58.8    22.4    27.1    29.2    18.8                    48.8
  59    71.9    39.4    55.1    50.7    27.5            67.8    69.3
  60   117.0    64.3    93.6    87.3    46.7                   120.4
  61    74.8    34.5    50.2    41.1    34.7            72.7    57.9
  62    53.1    25.5    41.2    26.6    26.0            43.5    41.8
  63    97.1    49.8    69.8    55.8    30.0                    71.0
  64    32.3    29.4    23.2    30.6    30.8                    48.4
  65    40.2    25.5    41.9    27.4    23.8            59.0    46.1
  66    33.3    10.4    16.4    20.5    43.5
  67    56.2    42.5    43.9    46.2    27.7            88.4    86.6
  68    33.7    20.0    26.5    24.0    13.4            43.3    37.8
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NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

SITE=633

| DAY | PRMF | TEAF | CHRF | CHPC | CHESSC | TGSO | TECH | TECA | CHRM |
|---|---|---|---|---|---|---|---|---|---|
| 69 | 10.8 | 12.8 | 14.7 | 12.5 | 29.2 | | 23.1 | 19.2 | |
| 70 | 21.7 | 27.6 | 20.8 | 19.5 | 24.5 | | 44.9 | 23.5 | |
| 71 | 48.3 | 33.4 | 33.1 | 37.4 | 28.8 | | 79.0 | 64.1 | |
| 72 | 59.6 | 30.5 | 34.2 | 38.9 | | | 98.7 | 82.1 | |
| 73 | 26.2 | 12.3 | 13.5 | 14.4 | 10.0 | | | 23.1 | |
| 74 | 23.7 | 12.7 | 14.9 | 10.6 | 41.4 | | | 30.7 | |
| 75 | 28.9 | 11.7 | 17.5 | 9.2 | 43.3 | | | 42.2 | |
| 76 | 34.0 | 14.4 | 15.4 | 17.3 | 34.2 | | | 38.7 | |
| 77 | | | | 16.2 | 39.0 | | | 70.6 | |
| 78 | 37.1 | 19.9 | 19.8 | 22.6 | [illegible] | | | 39.2 | |
| 79 | 48.1 | 31.9 | 30.6 | 33.5 | [illegible] | | | 67.4 | |
| 80 | 30.3 | 22.8 | 22.6 | 17.9 | 37.7 | | | | |
| 81 | 46.7 | | 26.4 | 27.1 | 67.0 | | 46.3 | | 97.3 |
| 82 | 28.5 | | 14.4 | 16.4 | 16.1 | | 28.2 | | 16.2 |
| 83 | 31.0 | 21.2 | 22.0 | 22.5 | 20.0 | | 23.9 | | 43.9 |
| 84 | 36.2 | 21.4 | 26.2 | 12.8 | 31.8 | | 30.4 | | 94.1 |
| 85 | 70.5 | 41.4 | 61.4 | 48.9 | 46.2 | 40.0 | 73.5 | | 98.2 |
| 86 | 32.8 | 19.8 | 25.5 | 22.7 | 31.3 | 19.2 | | | 47.6 |
| 87 | 31.7 | 20.0 | 22.6 | 18.7 | 22.0 | 15.7 | 25.3 | | 47.5 |
| 88 | | | | | 25.3 | | 36.3 | | 54.7 |
| 89 | 31.3 | 12.0 | 20.9 | 14.6 | 26.6 | 10.0 | 30.2 | | 45.0 |
| 90 | 41.8 | 19.8 | | 22.7 | 33.7 | 16.9 | 21.4 | | 53.5 |
| 91 | 43.0 | 22.6 | 28.2 | 23.9 | 19.5 | 19.6 | 53.5 | | 48.6 |
| 92 | 55.2 | 21.3 | 22.6 | 32.8 | 22.0 | 53.5 | 24.8 | | 31.6 |
| 93 | 57.0 | 38.7 | 42.7 | 44.7 | 43.3 | | 81.5 | 19.8 | 74.1 |
| 94 | 31.9 | 18.3 | 18.2 | 25.3 | 21.8 | 38.0 | 20.8 | 23.0 | 31.7 |
| 95 | 38.1 | 23.2 | 26.1 | 28.9 | 20.3 | 45.8 | 51.7 | 21.2 | 17.8 |
| 96 | 43.7 | 25.5 | 29.1 | 35.1 | 17.8 | 47.4 | 62.8 | 44.7 | 36.5 |
| 97 | 56.0 | 32.4 | 36.4 | 42.0 | | 63.4 | 68.0 | 51.1 | 45.2 |
| 98 | 64.0 | 40.8 | 40.6 | 46.6 | | 67.1 | 78.2 | 43.9 | 42.4 |
| 99 | 108.3 | 62.1 | 80.1 | 76.9 | 11.9 | 97.3 | 155.3 | 113.2 | 69.5 |
| 100 | 66.4 | 30.4 | 36.5 | 36.7 | 11.4 | 60.7 | 69.8 | 49.5 | 54.8 |
| 101 | 109.6 | 73.9 | 67.4 | 69.4 | 36.0 | 101.7 | 146.9 | 39.7 | 103.0 |
| 102 | 57.9 | 39.3 | 53.8 | 47.4 | 18.3 | 79.8 | 96.1 | 36.8 | 50.6 |
| 103 | 36.9 | 18.7 | 25.2 | 22.5 | | 38.1 | 39.9 | 32.5 | 31.6 |
| 104 | 45.4 | 17.6 | 28.7 | 22.8 | 53.0 | 38.0 | 47.5 | 41.2 | 35.9 |
| 105 | 53.1 | 32.3 | 44.0 | 37.8 | 44.2 | 52.3 | 78.1 | 20.3 | 59.4 |
| 106 | 66.5 | 47.7 | 50.7 | 44.5 | 167.8 | 41.0 | 53.3 | 26.6 | 63.7 |
| 107 | 75.5 | 48.7 | 60.7 | 54.1 | 73.7 | 56.9 | 91.2 | 67.9 | 90.3 |
| 108 | 64.5 | 41.6 | 36.1 | 34.2 | 90.5 | 32.5 | 70.7 | 48.4 | 51.4 |
| 109 | 64.7 | 47.0 | 45.2 | 37.8 | 52.0 | 38.0 | 85.5 | 25.9 | 61.5 |
| 110 | 73.4 | 60.5 | 64.4 | 57.9 | 46.9 | 52.9 | 148.6 | 37.0 | 84.4 |
| 111 | 83.0 | 47.9 | 51.4 | 44.9 | 43.1 | 43.4 | 99.6 | 40.8 | 67.8 |
| 112 | 50.9 | | 28.2 | 19.8 | 33.6 | 24.1 | 38.1 | 34.5 | 27.3 |
| 113 | 47.7 | 25.7 | 29.3 | 42.7 | 29.2 | 22.0 | | 47.9 | 32.2 |
| 114 | 48.6 | 24.3 | 25.1 | 38.1 | 17.9 | 22.1 | | 38.1 | 34.7 |
| 115 | 27.7 | 16.3 | 15.5 | 27.6 | 13.0 | 13.0 | 17.5 | 30.5 | 23.6 |
| 116 | | 54.9 | 68.6 | 65.9 | 76.3 | 48.9 | 128.6 | 43.2 | 84.8 |
| 117 | 66.2 | 38.7 | 42.8 | 53.5 | 37.3 | 33.1 | 69.8 | 37.3 | 56.5 |
| 118 | 98.3 | | 46.9 | 42.0 | 75.7 | 36.7 | 79.6 | 45.5 | 62.5 |
| 119 | 81.3 | 32.6 | 39.4 | 40.0 | 38.9 | 29.5 | 61.6 | 39.0 | 48.3 |
| 120 | 70.4 | 46.7 | 54.1 | 52.0 | 52.7 | 37.8 | 99.5 | 47.2 | 78.7 |
| 121 | 34.7 | 18.4 | 23.2 | 22.0 | 10.2 | 15.6 | 22.1 | 34.9 | 30.1 |

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NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

---------------------------------------- SITE=633 ----------------------------------------

| DAY | FRMF | TEAF | CHMF | CHRC | CHESSC | TGSC | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| 122 | 84.7 | 35.6 | 38.9 | 38.2 | [illegible] | 31.7 | 73.7 | 46.2 | 54.3 |
| 123 | 82.2 | 48.7 | 50.9 | 51.9 | [illegible] | 44.3 | 109.8 | 45.9 | 77.1 |
| 124 | 70.3 | 18.0 | 18.4 | 19.2 | 32.4 | 14.4 | 13.1 | 32.8 | 27.8 |
| 125 | 45.7 | 23.2 | 29.8 | 24.6 | 23.5 | 17.9 | 44.9 |  | 32.8 |
| 126 | 36.7 | 22.3 | 21.6 | 23.5 | 31.4 |  | 39.4 |  |  |
| 127 |  |  |  |  | 47.2 |  | 64.8 | 33.6 | 74.2 |
| 128 |  |  |  |  | [illegible] |  | 127.3 | 42.0 | 123.7 |
| 129 |  |  |  |  | [illegible] |  | 102.6 | 61.5 | 111.7 |
| 130 |  |  |  |  | 72.8 |  | 12.8 | 28.9 | 43.9 |
| 131 |  |  |  |  | 39.8 |  | 28.6 | 31.2 | 44.6 |
| 132 |  |  |  |  | 71.9 |  | 142.4 | 43.7 | 106.0 |
| 133 |  |  |  |  | 45.3 |  | 55.2 | 86.0 |  |
| 134 | 53.8 | 28.6 | 40.8 | 39.1 | 59.5 | 24.9 | 43.2 | 34.0 | 45.8 |
| 135 | 48.5 | 22.8 | 28.0 | 24.9 | 39.5 | 17.5 | 70.7 | 62.6 | 48.7 |
| 136 | 56.3 | 32.7 | 33.2 | 33.2 | 14.9 | 28.5 | 62.2 | 48.2 | 56.2 |
| 137 | 32.5 | 13.1 | 22.9 | 21.4 | 51.9 | 12.2 | 33.7 | 28.4 | 25.8 |
| 138 | 84.8 | 49.3 | 65.8 | 54.0 |  | 45.6 | 58.8 | 45.1 | 59.0 |
| 139 | 23.7 | 10.4 | 14.8 | 14.6 |  |  | 50.6 | 46.8 | 60.8 |
| 140 | 45.1 | 20.4 | 32.7 | 23.4 |  |  | 56.7 | 59.8 | 51.5 |
| 141 | 88.4 | 44.8 | 55.9 | 43.5 |  | 36.9 | 93.5 |  | 66.2 |
| 142 | 82.2 | 26.2 | 35.5 | 25.3 |  | 20.3 | 51.9 |  | 66.2 |
| 143 | 37.0 | 14.7 | 20.5 | 23.8 |  | 23.4 | 41.7 |  | 15.8 |
| 144 | 49.5 | 21.8 | 26.7 | 23.2 |  | 21.9 | 40.8 |  | 53.5 |
| 145 | 47.0 | 22.3 | 30.9 | 28.0 |  | 28.4 | 62.2 |  | 45.8 |
| 146 |  |  |  |  |  |  | 104.7 |  | 80.9 |
| 147 |  |  |  |  |  |  | 67.1 |  | 62.4 |
| 148 | 112.6 | 65.2 | 70.9 | 66.0 |  | 52.0 | 147.9 |  | 91.3 |
| 149 | 66.6 | 28.9 | 39.8 | 36.0 |  | 28.1 | 70.3 |  | 44.5 |
| 150 | 28.4 | 13.6 | 18.1 | 25.2 | 12.5 | 15.3 | 36.1 |  | 32.5 |
| 151 | 44.7 | 17.8 | 21.9 | 20.4 | 34.0 | 14.6 | 31.8 | 23.8 | 47.7 |
| 152 | 15.3 | 33.6 | 47.2 | 39.1 | 44.1 | 34.8 |  | 79.7 | 98.1 |
| 153 | 63.3 | 28.5 | 32.7 | 28.0 | 38.7 | 26.1 | 188.0 | 56.6 | 41.5 |
| 154 | 41.5 | 18.2 | 25.9 | 21.1 |  | 16.9 | 28.2 | 26.1 | 14.7 |
| 155 | 106.9 | 22.0 | 36.1 | 51.1 | 20.9 | 20.5 | 61.5 | 37.3 | 19.3 |
| 156 | 50.2 | 27.3 | 34.6 | 31.6 | 34.6 | 23.6 | 60.4 |  | 26.0 |
| 157 | 54.9 | 24.4 | 32.5 | 27.4 | 16.3 | 20.9 | 81.5 | 40.0 | 19.9 |
| 158 | 42.7 | 16.7 | 32.0 | 19.9 | 45.1 | 17.7 | 45.2 |  |  |
| 159 | 37.7 | 15.6 | 26.1 | 21.5 | 42.9 | 14.4 | 51.9 |  | 6.5 |
| 160 | 55.7 | 26.8 | 31.9 | 27.5 | 59.8 | 22.1 | 70.5 |  | 53.5 |
| 161 | 54.0 | 20.9 | 29.4 | 23.3 | 43.1 | 20.9 |  |  | 32.7 |
| 162 | 116.8 | 49.0 | 28.0 | 60.0 | 53.5 | 13.7 |  |  |  |
| 163 | 92.0 | 29.0 | 25.5 | 36.2 | 29.4 | 10.4 | 30.5 | 19.7 | 12.9 |
| 164 | 114.1 | 38.5 | 27.1 | 45.2 | 58.2 | 22.3 | 88.0 | 49.0 | 51.2 |
| 165 | 121.3 | 42.9 | 29.6 | 39.8 | 42.7 | 17.6 |  | 43.4 | 35.6 |
| 166 | 115.9 | 41.1 | 23.8 | 40.5 | 42.1 | 19.0 | 69.8 | 50.5 | 32.9 |
| 167 | 175.5 | 45.9 | 31.6 | 43.5 | 58.7 | 24.1 | 82.6 | 53.7 | 43.2 |
| 168 | 141.4 | 54.6 | 38.5 | 55.4 | 60.7 | 26.4 | 94.4 |  |  |
| 169 | 37.6 | 11.3 | 17.9 | 23.2 |  | 9.9 | 39.1 | 16.7 | 28.6 |
| 170 | 29.4 | 16.3 | 14.6 | 16.6 | 20.3 | 9.0 | 28.6 | 21.1 | 14.5 |
| 171 | 69.7 | 39.8 | 42.5 | 46.9 | 49.7 | 32.8 |  | 40.7 | 53.4 |
| 172 | 61.3 | 42.7 | 44.1 | 43.2 | 60.8 | 30.5 | 133.9 | 57.5 | 55.6 |
| 173 | 47.2 | 19.5 | 23.8 |  | 29.9 | 17.3 | 41.4 | 29.9 | 30.9 |
| 174 | 91.7 | 54.3 | 56.2 | 52.0 | 66.3 | 44.0 | 145.5 | 58.1 | 70.9 |

NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

SITE=633

| DAY | FRMF | TEAF | CHRF | CHRC | CHFSSD | TGSC | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| 175 | 105.9 | 44.6 | 50.8 | 57.6 | 72.9 | 38.9 | 121.2 | 82.9 | 78.5 |
| 176 | 50.0 | 23.0 | 33.8 | 25.2 | 31.0 | 21.3 | 47.8 | | |
| 177 | | | | | | | 61.1 | 34.1 | 23.1 |
| 178 | | | | | | | 49.0 | 24.8 | 18.9 |
| 179 | | | | | | | 42.7 | 23.5 | 20.4 |
| 180 | 35.0 | 12.0 | 15.2 | 14.6 | 13.1 | 9.0 | 19.2 | 14.9 | 10.2 |
| 181 | 46.2 | 27.9 | 33.3 | 23.7 | 32.9 | 19.5 | 56.4 | 44.6 | 20.9 |
| 182 | 135.1 | 51.5 | 58.5 | [illegible] | 54.0 | 41.0 | 141.0 | 87.8 | 96.9 |
| 183 | | 20.0 | 26.8 | [illegible] | 41.6 | 20.5 | 26.7 | | 29.8 |
| 184 | 66.7 | 13.1 | 32.4 | 32.4 | [illegible] | 15.4 | 27.8 | 20.9 | |
| 185 | 124.4 | 21.9 | 49.2 | 44.6 | 37.6 | 24.6 | 71.4 | 46.3 | 43.8 |
| 186 | 58.2 | 17.1 | 21.3 | 34.9 | 28.1 | 16.9 | 42.3 | 35.6 | 27.4 |
| 187 | 68.3 | 31.8 | 35.2 | 58.0 | 43.4 | 29.1 | 87.1 | 47.0 | 47.9 |
| 188 | 46.9 | 20.3 | | 38.0 | 39.0 | 21.0 | 52.2 | 31.8 | 27.0 |
| 189 | 60.5 | 26.0 | | 52.5 | 35.6 | 27.0 | 68.0 | 46.7 | 45.8 |
| 190 | 69.1 | 25.8 | 39.8 | 52.9 | 40.6 | 27.1 | 82.9 | | 50.7 |
| 191 | | | | | | | 77.9 | 47.6 | 40.7 |
| 192 | | | | | | | 34.9 | | 17.2 |
| 193 | 94.3 | | 55.6 | 29.6 | | | 55.3 | | 41.2 |
| 194 | 88.2 | 26.3 | 38.4 | | 31.8 | 27.8 | 70.5 | 45.0 | 44.6 |
| 195 | 49.0 | 20.0 | 29.4 | 40.8 | 27.0 | | 57.9 | 33.6 | 28.8 |
| 196 | 47.5 | 14.6 | 23.5 | 29.4 | 34.5 | 18.8 | 35.8 | 24.8 | 24.7 |
| 197 | 61.6 | 25.6 | 34.0 | 36.2 | 44.3 | 20.9 | 53.8 | 36.3 | 30.8 |
| 198 | 63.5 | 28.4 | 35.2 | 42.7 | 46.8 | 27.0 | | | 34.7 |
| 199 | 31.9 | 14.8 | 21.3 | 22.1 | 26.9 | 17.6 | 30.3 | 25.0 | 17.0 |
| 200 | 54.5 | 20.1 | 25.5 | 32.2 | 39.5 | 20.4 | 44.6 | 22.8 | 16.0 |
| 201 | 64.6 | 25.0 | 29.3 | | 47.1 | 21.5 | 47.0 | 36.1 | 23.9 |
| 202 | 69.4 | 27.9 | 34.0 | 38.5 | 57.2 | 26.7 | 85.6 | 46.6 | 22.7 |
| 203 | 32.7 | 14.6 | 20.8 | 23.4 | 29.6 | 15.3 | 25.5 | | |
| 204 | 64.5 | 24.3 | 33.3 | 33.5 | 61.9 | 19.0 | | | 14.6 |
| 205 | 58.0 | 23.3 | 28.5 | 29.2 | 27.7 | 19.5 | 55.1 | | 17.3 |
| 206 | 26.8 | 10.8 | 13.5 | 16.0 | 43.3 | 46.7 | 8.7 | 10.6 | 6.6 |
| 207 | 55.3 | 18.2 | 24.6 | 24.1 | 33.2 | 77.2 | 20.5 | 21.9 | 10.5 |
| 208 | 33.3 | 19.3 | 19.8 | 25.4 | 39.2 | 15.2 | 33.2 | 28.4 | 10.9 |
| 209 | 55.8 | 25.4 | 28.5 | 28.9 | | 21.1 | 47.0 | 35.8 | 16.9 |
| 210 | 59.2 | 22.4 | 7.5 | 31.8 | 27.2 | 16.6 | 55.7 | 38.5 | 12.7 |
| 211 | 26.2 | 14.4 | 42.2 | 17.9 | 26.5 | 24.2 | 18.8 | 10.1 | 19.9 |
| 212 | 41.5 | 21.7 | 31.2 | 25.8 | 23.3 | 24.6 | 48.3 | 25.9 | 13.8 |
| 213 | 39.8 | 18.9 | 34.2 | 24.2 | 17.0 | 21.3 | | 11.7 | 7.0 |
| 214 | 45.3 | 17.9 | 37.2 | 27.5 | 45.4 | 19.7 | | 29.9 | 10.5 |
| 215 | 64.6 | 25.9 | 54.5 | 34.5 | 24.7 | 30.3 | | | 23.0 |
| 216 | 22.4 | 13.8 | 26.6 | 15.6 | 17.8 | 15.7 | | 20.7 | 13.0 |
| 217 | 36.0 | 14.3 | 27.5 | 20.1 | 25.7 | 6.2 | | 27.2 | 11.1 |
| 218 | 26.2 | 19.1 | 21.8 | 18.6 | 27.7 | | | | 8.6 |
| 219 | 35.3 | 16.6 | 18.9 | 16.8 | 17.1 | | | 21.9 | 10.0 |
| 220 | 50.8 | 22.9 | 31.3 | 30.9 | 21.1 | | | | 19.6 |
| 221 | 59.5 | 41.4 | 49.5 | 41.1 | 38.6 | | | 58.2 | 28.0 |
| 222 | 32.8 | 26.0 | 24.1 | 22.1 | 27.4 | | | 22.4 | 15.0 |
| 223 | 62.8 | 25.9 | 36.0 | 35.5 | 44.2 | | | 46.9 | |
| 224 | | 14.8 | 21.0 | 17.8 | 16.5 | | | 29.6 | 15.9 |
| 225 | 37.9 | 13.4 | 36.5 | 39.2 | 32.0 | | | | 39.6 |
| 226 | 24.9 | 12.3 | | 30.4 | 15.8 | | | 21.4 | 32.7 |
| 227 | 49.1 | 25.1 | 36.0 | 39.6 | 23.8 | | | | 30.0 |

NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

------------------------------------ SITE=633 ------------------------------------

| DAY | FRMP | TEAF | CHPF | CHRC | CHESSC | TGSC | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| 228 | 55.2 | 33.7 |  | 54.8 | 32.9 |  |  | 45.0 | 43.1 |
| 229 | 39.8 | 26.0 | 46.1 | 46.2 | 26.5 |  |  | 44.4 | 38.1 |
| 230 | 60.0 | 26.3 | 50.5 | 42.5 | 46.3 |  |  | 38.0 | 31.9 |
| 231 | 28.7 | 14.1 |  |  | 28.0 |  |  | 18.2 | 15.2 |
| 232 | 37.9 | 23.9 | 37.6 | 29.4 | 43.2 |  |  | 31.6 | 21.8 |
| 233 | 53.9 |  | 37.8 | 35.4 | 33.2 |  |  | 32.6 | 26.3 |
| 234 | 50.3 | 30.9 | 47.9 | 39.3 | 42.[illegible] |  |  | 47.2 | 35.0 |
| 235 | 55.9 | 21.8 | 35.4 | 30.5 | [illegible] |  |  | 57.2 | 42.4 |
| 236 | 64.3 | 26.6 | 36.2 | 27.1 | 30.9 |  |  | 31.1 | 22.1 |
| 237 | 32.4 | 20.3 | 33.1 | 25.6 | 18.1 |  |  | 25.1 | 15.9 |
| 238 | 24.5 | 36.8 | 43.3 | 36.0 | 45.4 |  |  | 60.6 | 36.0 |
| 239 | 61.5 | 26.2 | 57.1 | 40.7 | 38.3 |  |  | 41.2 | 26.8 |
| 240 | 39.0 | 24.6 | 47.5 |  |  |  |  | 48.6 | 25.0 |
| 241 |  |  |  |  | 77.1 |  |  | 53.3 | 34.2 |
| 242 | 56.5 | 24.5 | 58.7 | 54.7 | 61.7 |  |  |  | 28.8 |
| 243 | 37.8 | 15.3 | 42.7 | 34.7 | 45.3 |  |  | 24.7 | 16.2 |
| 244 | 58.2 | 27.1 | 61.5 | 53.3 | 74.0 |  |  |  | 27.7 |
| 245 | 39.9 | 24.6 | 54.4 | 51.2 | 23.5 |  |  | 55.3 | 28.4 |
| 246 | 46.0 | 19.9 | 58.7 | 41.9 | 11.1 |  |  | 48.4 | 19.6 |
| 247 | 60.7 | 20.0 | 50.2 | 49.9 | 11.3 |  |  |  | 16.6 |
| 248 | 72.3 | 23.3 | 58.4 | 54.9 | 19.6 |  |  |  | 29.5 |
| 249 | 96.1 | 23.5 | 85.5 | 79.0 | 53.9 |  |  | 30.2 | 16.6 |
| 250 | 35.4 | 16.6 | 37.4 | 39.6 |  |  |  |  | 9.5 |
| 251 | 57.3 | 17.2 | 56.6 | 55.8 | 34.9 |  |  |  | 16.7 |
| 252 | 64.2 | 23.8 | 66.0 | 56.0 | 26.4 |  |  |  | 24.5 |
| 253 | 13.7 | 11.2 | 23.1 | 15.9 | 15.4 |  |  |  | 18.8 |
| 254 | 14.9 | 1.3 | 13.1 | 11.3 | 28.8 |  |  |  | 8.3 |
| 255 | 30.0 |  | 21.4 | 18.9 |  |  |  |  | 19.3 |
| 256 | 51.4 | 22.3 | 31.4 | 22.6 | 77.2 |  |  |  | 34.8 |
| 257 | 27.7 | 16.2 | 23.8 | 21.2 | 47.4 |  |  |  | 29.4 |
| 258 | 17.2 | 9.0 | 14.2 | 14.5 | 18.5 |  |  |  |  |
| 259 | 36.2 | 20.3 | 35.3 | 18.9 | 21.6 |  |  |  | 16.3 |
| 260 | 70.0 | 32.3 | 45.9 | 36.7 |  |  |  |  | 13.2 |
| 261 |  |  |  |  |  |  |  |  | 7.7 |
| 262 |  |  |  |  |  |  |  |  | 17.5 |
| 263 |  |  |  |  | 22.8 |  |  |  | 37.9 |
| 264 | 42.9 | 14.6 | 26.8 | 21.4 | 27.3 |  |  |  | 33.1 |
| 265 | 62.7 | 17.1 | 26.8 |  | 16.8 |  |  |  | 41.0 |
| 266 | 31.2 | 10.1 | 19.5 | 14.6 | 36.6 |  |  | 25.2 | 31.8 |
| 267 | 43.9 | 18.6 | 44.8 | 31.4 | 29.9 |  |  | 36.9 | 47.8 |
| 268 | 34.8 | 8.1 | 28.9 | 21.8 | 16.9 |  |  | 14.5 | 20.6 |
| 269 | 31.3 | 16.4 | 19.9 | 28.7 | 25.6 |  |  | 26.9 | 44.5 |
| 270 | 64.7 | 18.6 | 53.9 | 52.9 | 43.3 |  |  | 13.9 | 51.3 |
| 271 | 34.5 | 16.1 | 30.9 | 32.8 | 21.7 |  |  |  | 43.7 |
| 272 | 22.0 | 14.7 | 31.0 | 33.3 | 18.9 |  |  | 19.1 | 40.5 |
| 273 | 45.3 | 17.1 | 51.3 | 34.5 | 31.3 |  |  | 72.7 | 45.8 |
| 274 | 57.1 | 15.2 | 14.6 | 20.0 | 31.9 |  |  | 81.1 | 47.8 |
| 275 | 32.2 | 11.8 | 12.4 | 14.5 | 16.3 |  |  | 22.7 | 35.5 |
| 276 | 25.8 | 9.2 | * | 11.8 | 25.6 |  |  | 16.8 | 19.9 |
| 277 | 43.9 | 15.8 | 23.8 | 20.7 | 17.7 |  |  | 33.1 | 24.6 |
| 278 | 27.7 | 8.6 | 10.8 | 11.6 | 15.2 |  |  | 15.5 | 17.7 |
| 279 | 48.4 | 14.3 | 18.4 | 19.4 | 15.8 |  |  | 23.8 | 23.2 |
| 280 | 75.2 | 42.8 | 58.8 | 60.8 | 44.0 |  |  |  | 51.9 |

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                    NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

***************************************** SITE#633    ****************************************

DAY    PRMP    TEAF    CHMF    CHRC    CHESSO    TGSC    TECH    TEC4    CHEM

281   119.1    49.8    54.6    37.1     94.7                              36.8
282                                     18.4                              29.5
283    84.1    28.2    41.1    39.9     26.[illegible]                   105.2    34.2
284    88.7    24.9    16.8    11.4     39.[illegible]                    14.8    18.1
285    71.2    31.1    24.5    25.4     21.8                              21.2
286    89.0    35.2    44.2    28.5     58.3                              22.4
287                                     68.2
289                                     44.9
290                                     12.9
291                                     15.7
292                                     10.8
293                                     17.1
294                                     16.0
295                                     19.3
296                                     22.6
297                                     16.9
298                                     29.1
299                                     11.9
300                                     33.2
302                                     19.6
303                                     19.7
304                                     13.8
305                                     30.9
306                                     14.7
307                                     20.2
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                    NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

    ************************** *********** SITE=901      ****************************************
    DAY     PRMP     TEAP     CHRP     CHRD     CHESSC    TGSC    TECH    TEC4    CHEM

     27                                          19.3
     28                                  [illegible].4
     29     90.2     37.0     60.0  [illegible]   62.9
     30     81.2     32.4     54.5  [illegible]  119.4
     31    134.8     81.0 [illegible] [illegible]  55.8
     32    111.4     43.9     86.6  [illegible]
     33     79.4     39.8     61.8  [illegible] [illegible].3
     34    129.1     59.6     64.1     60.7  [illegible].7
     35     99.7     39.4
     36     98.5     43.6     57.1     52.2      68.5
     37     82.3     34.6              44.5      38.6
     38     52.1     18.8     28.8     29.8      12.4
     39     92.4     32.2     45.1     40.1
     40     69.5     29.3     35.6               37.3
     41    125.4     40.1     62.0     58.4      70.9
     42    150.8     41.6     86.2     74.1      52.1
     43     74.0     28.8     46.1     47.2      24.8
     44     77.7     43.5     59.1     52.7      48.5
     45     91.9     66.6     72.6     72.8      55.9
     46    105.3     60.2     68.0     66.1      55.8
     47     69.1     37.7     60.7     59.5      32.2
     48     72.9     59.2     62.9     56.8      44.6
     49     97.1     27.6     68.6     64.2      58.8
     50     64.9     57.3              58.2      44.5
     51     95.7     72.1     83.6     63.6      73.9
     52     80.2     69.7     58.8     65.6      53.7
     53              61.0     64.7     63.6      73.8
     54     58.7     43.5              46.6      82.6
     55     70.2     48.7     52.1     53.5      89.5
     56     73.3     39.5     45.4     54.5      59.7
     57     93.2     29.5     53.4     52.4      59.7
     58     81.5     26.2     44.1     39.1      78.1
     59    116.3     42.3     68.1     59.8      59.4
     60    183.8     71.8    117.2    108.4     102.9
     61    151.4     62.3     98.8     82.6      37.6
     62    168.7     66.7    111.5    108.2     100.5
     63    164.0     76.5    117.1     89.4      97.1
     64     72.1     44.9     56.1     52.2      67.2
     65     57.0     23.2     30.0     29.6      46.2
     66     53.8     28.1     34.8     31.5      37.6
     67    107.9     78.6     75.8     71.4      34.4
     68     91.2     67.7     68.6     62.2      45.1
     69     83.5     57.5     58.2     52.2      61.2
     70     78.4     38.3     47.8     44.9      69.5
     71     55.3     27.8     40.1     40.1      77.7
     72     45.0     33.1     42.4     40.8      69.2
     73     86.5     55.9     75.9     72.0      71.9
     74     74.9     46.8     64.7     59.8      60.8
     75     76.4     48.9     63.3     61.4
     76     72.9     41.0     53.9     52.1      63.3
     77     57.4     39.1     60.9     51.2      66.7
     78     96.7     38.2     57.8     51.9
     79     82.9     42.0     52.2               59.1
```

NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

SITE=901

| DAY | PRMF | TEAF | CHRF | CHRC | CHESBC | TGBC | TECH | TEC4 | CHFM |
|---|---|---|---|---|---|---|---|---|---|
| 80 | 82.0 | 47.1 | 53.9 | 53.9 | 68.5 | | | | |
| 81 | 119.9 | 44.3 | 71.2 | 67.4 | 99.2 | | | | |
| 82 | 102.5 | 52.6 | 67.6 | 62.[illegible] | 110.3 | | | | |
| 83 | 88.8 | 29.6 | 55.5 | 51.4 | | | | | |
| 84 | 81.6 | 41.4 | 50.7 | 47.8 | [illegible] | | | | |
| 85 | 74.3 | 33.4 | 53.1 | 48.1 | 94.2 | 43.7 | | | |
| 86 | 74.5 | 31.0 | 51.[illegible] | [illegible] | 58.1 | 38.[illegible] | | | |
| 87 | 79.7 | 29.4 | 47.[illegible] | [illegible] | 51.8 | 37.[illegible] | | | |
| 88 | 94.8 | 37.5 | 53.9 | [illegible] | 60.9 | 43.7 | | | |
| 89 | 77.1 | 24.9 | 47.8 | 39.5 | [illegible] | 34.3 | | | |
| 90 | 110.1 | 32.1 | 64.4 | 49.4 | | 45.0 | | | |
| 91 | 71.0 | 27.3 | 46.1 | 32.2 | 30.7 | 31.7 | | | |
| 92 | 41.0 | 21.5 | 28.4 | 34.5 | | 51.4 | | | |
| 93 | 92.9 | 42.7 | 56.6 | 62.5 | 95.5 | 91.5 | | | |
| 94 | 86.5 | 48.7 | 62.4 | 66.6 | 71.0 | 95.5 | | | |
| 95 | 119.4 | 64.1 | 69.8 | 77.6 | | 117.3 | | | |
| 96 | 96.7 | 48.3 | 61.3 | 67.9 | 35.6 | 108.9 | | | |
| 97 | 154.3 | 80.8 | 103.3 | 96.9 | 96.5 | 160.5 | | | |
| 98 | 127.1 | 58.8 | 75.5 | 76.9 | 78.9 | 120.3 | | | |
| 99 | 86.5 | 25.0 | 38.1 | 33.6 | 51.1 | 56.1 | | | |
| 100 | 110.0 | 32.1 | 55.5 | 45.6 | 101.9 | 73.5 | | | |
| 101 | 96.9 | 32.6 | 54.9 | 45.6 | 61.4 | 67.0 | | | |
| 102 | 141.3 | 49.3 | 63.5 | 60.6 | 66.1 | 83.0 | | | |
| 103 | 115.3 | 55.6 | 78.7 | 75.2 | 91.1 | 106.2 | | | |
| 104 | 109.2 | 50.8 | 65.8 | 60.6 | 62.6 | 88.8 | | | |
| 105 | 80.6 | 36.3 | 43.5 | 42.2 | 54.0 | 60.8 | | | |
| 106 | 83.0 | 33.8 | 49.8 | 44.8 | | 38.6 | | | |
| 107 | 78.6 | 36.0 | 37.3 | 35.5 | 43.6 | 33.4 | | | |
| 108 | 64.1 | 47.9 | 60.4 | 48.4 | 56.1 | 49.7 | | | |
| 109 | 84.4 | 50.7 | 52.4 | 48.6 | 56.5 | 43.8 | | | |
| 110 | 83.8 | 49.3 | 53.2 | 44.8 | 77.8 | 33.0 | | | |
| 111 | 94.7 | 43.6 | 58.1 | 39.2 | 25.2 | 40.8 | | | |
| 112 | 119.0 | 57.9 | 66.5 | 55.8 | 66.0 | 48.7 | | | |
| 113 | 102.5 | 40.5 | 52.6 | 58.2 | 47.3 | 43.4 | | | |
| 114 | 62.2 | 26.0 | 40.9 | 53.1 | 57.2 | 38.3 | | | |
| 115 | 66.5 | 26.6 | 37.1 | 42.2 | 51.0 | 28.3 | | | |
| 116 | 54.5 | 25.4 | 32.0 | 34.0 | 41.3 | 22.7 | | | |
| 117 | 93.2 | 35.8 | 46.2 | 60.5 | 80.3 | 37.3 | | | |
| 118 | 154.1 | 50.0 | 64.2 | 73.8 | 68.1 | 48.8 | | | |
| 119 | 110.8 | 61.0 | 71.5 | 75.1 | 98.8 | 58.0 | | | |
| 120 | 83.8 | 35.5 | 41.1 | 42.2 | 96.6 | 30.9 | | | |
| 121 | 89.4 | 45.8 | 49.1 | 48.8 | 100.9 | 33.9 | | | |
| 122 | 100.7 | 43.4 | 46.6 | | 85.0 | 34.1 | | | |
| 123 | 96.5 | 33.4 | 49.2 | 40.0 | 73.3 | | | | |
| 124 | 68.6 | 20.6 | 36.6 | 37.8 | 77.4 | 26.2 | | | |
| 125 | 78.4 | 36.9 | 46.8 | 44.6 | 67.1 | 28.6 | | | |
| 126 | 89.1 | 38.3 | 45.8 | 45.9 | 79.3 | 34.9 | | | |
| 127 | | | | | 40.7 | | | | |
| 128 | | | | | 118.2 | | | | |
| 129 | | | | | 259.0 | | | | |
| 130 | | | | | 150.9 | | | | |
| 133 | | | | | 80.5 | | | | |
| 134 | 65.4 | 31.2 | 36.7 | 35.4 | 67.3 | 29.5 | | | |

1

NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

------------------------------------ SITE=901 ------------------------------------

| DAY | FRMF | TEAF | CHRF | CHRC | CHESBC | IGSC | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| 135 | 68.4 | 33.8 | 43.6 | 35.4 | | 29.7 | | | |
| 136 | 75.3 | 38.6 | 42.1 | 34 | | 26.5 | | | |
| 137 | 64.3 | 30.5 | 36.0 | 38. | 86.9 | 24.4 | | | |
| 138 | 66.3 | 29.3 | 39.3 | 30. | | 29.4 | | | |
| 139 | 68.0 | 27.4 | 30.8 | 32. | 45.7 | 23.2 | | | |
| 140 | 95.8 | 43.8 | 54.5 | 56. | 65.9 | 41.2 | | | |
| 141 | 78.7 | 39.3 | 42.9 | 36.5 | [illegible] | 30.5 | | | |
| 142 | 74.0 | 28.9 | 39.5 | 35.2 | 49.6 | 37.6 | | | |
| 143 | 68.9 | 26.6 | 38.2 | 29.2 | 52.1 | 25.2 | | | |
| 144 | 82.2 | 42.6 | 51.3 | 47.9 | 78.0 | 42.5 | | | |
| 145 | 72.2 | 38.4 | 43.6 | 38.2 | | 34.7 | | | |
| 146 | 78.9 | 36.3 | 47.9 | 40.2 | | 36.7 | | | |
| 147 | 106.3 | 46.5 | 58.7 | 47.4 | 81.7 | 44.1 | | | |
| 148 | 77.3 | 29.2 | 45.4 | 43.8 | | 33.0 | | | |
| 149 | 50.3 | 22.9 | 34.8 | 31.3 | | 22.3 | | | |
| 150 | 87.6 | 32.5 | 43.8 | 39.1 | 68.5 | 29.7 | | | |
| 151 | 67.4 | 33.4 | 40.4 | 38.6 | 63.2 | 28.0 | | | |
| 152 | 92.8 | 41.3 | 56.2 | 54.9 | 72.5 | 44.0 | | | |
| 153 | 117.9 | 54.0 | 70.6 | 61.8 | 70.3 | 53.9 | | | |
| 154 | 82.2 | 28.8 | 42.9 | 45.6 | 56.8 | 33.6 | | | |
| 155 | 115.9 | 50.9 | 91.1 | 73.8 | 92.9 | 61.3 | | | |
| 156 | | 28.7 | 59.1 | 57.1 | 56.2 | 42.2 | | | |
| 157 | 82.5 | 34.1 | | 43.9 | 47.0 | 32.5 | | | |
| 158 | 70.8 | 33.1 | 46.7 | 38.5 | 52.3 | 29.7 | | | |
| 159 | 48.9 | 17.8 | 30.2 | 29.1 | 40.0 | 20.5 | | | |
| 160 | 65.2 | 31.1 | 52.4 | 45.1 | 67.1 | 34.3 | | | |
| 161 | 76.7 | 32.2 | 51.2 | 42.1 | 54.2 | 33.3 | | | |
| 162 | 110.6 | | 35.6 | 44.9 | 45.0 | 25.7 | | | |
| 163 | 131.2 | 31.3 | 31.5 | 48.0 | 41.6 | 21.1 | | | |
| 164 | 79.2 | 56.2 | 45.9 | 47.4 | | 34.2 | | | |
| 165 | 74.9 | 25.4 | 38.6 | 54.5 | 41.9 | 28.3 | | | |
| 166 | 64.8 | 21.0 | 28.0 | 40.7 | 41.2 | 17.3 | | | |
| 167 | 122.5 | 34.6 | 36.9 | | | | | | |
| 168 | 148.7 | 55.7 | 49.9 | 59.4 | | 29.8 | | | |
| 169 | 59.0 | 21.4 | 28.4 | 31.2 | | 17.7 | | | |
| 170 | 60.9 | 25.5 | 28.7 | 39.4 | 26.4 | 22.2 | | | |
| 171 | 77.7 | 40.4 | 42.5 | 41.3 | 75.9 | 27.7 | | | |
| 172 | 112.6 | 63.4 | 64.0 | 63.8 | 54.2 | 45.4 | | | |
| 173 | 166.9 | 45.9 | 50.6 | 50.6 | 65.0 | 36.2 | | | |
| 174 | 73.2 | 37.7 | 39.9 | 40.1 | 21.6 | | | | |
| 175 | 64.7 | 34.9 | 37.2 | 39.3 | | 27.7 | | | |
| 176 | 58.1 | 26.4 | 31.1 | 27.2 | 33.5 | 18.6 | | | |
| 177 | 68.6 | 25.6 | 30.7 | 28.0 | 82.4 | 21.4 | | | |
| 178 | 59.1 | 23.6 | 28.5 | 29.2 | 70.2 | 22.1 | | | |
| 179 | 54.0 | 26.9 | 27.9 | 24.6 | 73.9 | 19.2 | | | |
| 180 | 83.4 | 59.0 | 52.6 | 52.2 | 100.5 | 43.1 | | | |
| 181 | 87.6 | 52.2 | 53.8 | 48.6 | 107.3 | 42.7 | | | |
| 182 | 87.1 | 58.0 | 56.5 | 52.9 | 153.0 | 41.6 | | | |
| 183 | 80.3 | 41.2 | 56.0 | 56.5 | | 32.7 | | | |
| 184 | 42.2 | 25.4 | 34.1 | 28.0 | 120.6 | 23.5 | | | |
| 185 | 69.7 | 29.8 | 37.4 | 45.1 | 95.5 | 29.2 | | | |
| 186 | 121.8 | 54.1 | 80.0 | 87.9 | 75.8 | 46.5 | | | |
| 187 | 89.9 | 44.7 | 58.6 | 54.1 | 57.6 | 37.3 | | | |

NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

---------------------------------------- SITE=901 ----------------------------------------

| DAY | FRMP | TEAP | CHPI | CHRC | CHESSC | TGSC | TECH | TECH | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| 188 | 53.0 | 28.4 | 32.5 | 43.9 | 6.6 | 27.3 | | | |
| 189 | 70.8 | 27.1 | 40.9 | 41.3 | 21.9 | 23.9 | | | |
| 190 | 54.4 | 24.7 | 38.6 | | | 24.7 | | | |
| 191 | 71.5 | 23.2 | 39.2 | 46.[illegible] | [illegible] | 26.0 | | | |
| 192 | 74.8 | 35.1 | 49.9 | 55. | 45.2 | 35.6 | | | |
| 193 | 72.6 | 28.1 | 50.4 | 55. | 51.6 | 31.5 | | | |
| 194 | 79.5 | 53.8 | 56.0 | 68. | | 46.1 | | | |
| 195 | 82.6 | 48.4 | 60.6 | 55. | 60.7 | 39.8 | | | |
| 196 | 97.5 | 45.9 | 71.4 | 78.[illegible] | | 44.9 | | | |
| 197 | 118.9 | 52.5 | 73.8 | 66.1 | | 51.1 | | | |
| 198 | 76.2 | | 53.4 | 59.9 | 101.6 | 37.3 | | | |
| 199 | 58.5 | 21.2 | 57.4 | 53.9 | 120.1 | 39.0 | | | |
| 200 | 109.6 | 48.9 | 70.6 | 66.8 | 108.9 | 45.4 | | | |
| 201 | 132.2 | 53.7 | 74.5 | 80.8 | 315.8 | 58.4 | | | |
| 202 | 92.9 | 45.6 | 60.2 | 67.5 | 121.6 | 42.4 | | | |
| 203 | 63.2 | 24.3 | 37.2 | 38.7 | 44.7 | 28.1 | | | |
| 204 | 81.0 | 28.7 | 47.6 | 44.8 | | 29.3 | | | |
| 205 | 70.8 | 26.8 | 30.8 | 33.4 | 99.2 | 18.7 | | | |
| 206 | 70.4 | 32.4 | 37.5 | 48.9 | 32.7 | 25.5 | | | |
| 207 | 68.0 | 30.6 | 38.6 | 46.7 | | 26.5 | | | |
| 208 | 73.8 | 47.3 | 54.2 | | 58.3 | 36.4 | | | |
| 209 | 146.1 | | 103.5 | 100.5 | 114.9 | 62.7 | | 107.6 | 130.1 |
| 210 | 139.8 | 87.5 | 104.7 | 97.9 | 72.1 | 57.1 | | 88.4 | 103.4 |
| 211 | | 54.7 | 78.5 | 58.6 | 105.5 | 42.6 | | 56.5 | 88.3 |
| 212 | 75.1 | 39.0 | 43.6 | 34.8 | 69.6 | 24.0 | | 47.5 | 54.2 |
| 213 | 62.4 | 30.9 | 51.5 | 36.5 | 49.8 | 31.8 | | 42.7 | 52.1 |
| 214 | 83.1 | 40.8 | 61.1 | 49.8 | 77.0 | 39.9 | | 66.0 | 88.0 |
| 215 | 103.6 | 47.7 | 78.2 | 62.4 | 79.9 | 51.6 | | 55.8 | 96.4 |
| 216 | 100.3 | 39.5 | 66.1 | 52.7 | 57.2 | 43.3 | | 39.1 | 76.4 |
| 217 | 68.5 | 33.1 | 60.8 | 34.2 | | 33.8 | | | 57.4 |
| 218 | 58.2 | 25.2 | 30.8 | 33.2 | | | | 28.0 | 47.1 |
| 219 | 108.2 | 53.7 | 67.3 | 62.9 | 4[illegible].1 | | | 66.8 | 91.9 |
| 220 | 112.1 | 69.8 | 70.4 | 75.6 | 95.7 | | | 83.4 | 111.0 |
| 221 | 65.3 | 33.1 | 46.6 | 35.3 | 82.1 | | | 31.7 | 57.8 |
| 222 | 81.4 | | 51.6 | | | | | 40.4 | 61.4 |
| 223 | 69.0 | 32.8 | 43.4 | 40.2 | | | | 44.2 | 61.5 |
| 224 | | 52.1 | 61.9 | | | | | 66.6 | 84.2 |
| 225 | 93.4 | 62.9 | 102.9 | 93.5 | 92.0 | | | 89.8 | 123.0 |
| 226 | 88.8 | 45.7 | 80.4 | 71.6 | | | | 56.6 | 85.5 |
| 227 | 100.3 | 53.9 | 82.0 | 65.8 | 69.7 | | | | |
| 228 | 115.0 | 51.7 | 80.9 | 67.8 | | | | | |
| 229 | 87.4 | 46.2 | 59.6 | 56.6 | 66.9 | | | | 50.1 |
| 230 | 60.9 | 27.3 | 53.8 | | | | | | 43.9 |
| 231 | 54.1 | 27.5 | 48.2 | 51.2 | 53.2 | | | | 48.9 |
| 232 | 77.0 | 43.8 | 56.2 | 52.8 | | | | | 69.5 |
| 233 | 88.4 | 43.5 | 56.9 | 56.6 | | | | | 66.1 |
| 234 | 97.4 | 53.3 | 81.8 | 64.0 | 83.9 | | | | 84.5 |
| 235 | 100.3 | 49.5 | | 60.1 | 55.2 | | | | 66.1 |
| 236 | 65.2 | 43.9 | 64.5 | 52.4 | | | | | 71.3 |
| 237 | 71.7 | 49.1 | 65.8 | 60.6 | 94.1 | | | | 80.9 |
| 238 | 85.7 | 54.6 | 70.2 | 62.0 | 101.0 | | | 60.7 | 80.3 |
| 239 | 310.9 | | 114.9 | 86.9 | 105.9 | | | 97.5 | 105.7 |
| 240 | 112.8 | 61.8 | | 69.1 | 124.3 | | | 76.2 | 109.5 |

## NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

************************************** SITE#001 ****************************************

| DAY | FRMF | TEAF | CHRF | CHRC | CHEMSC | IGSC | TECH | TECH | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| 241 | 72.8 | 37.2 | 59.1 | 45.3 | 65.9 | | | 33.1 | 57.6 |
| 242 | 68.7 | 39.4 | 62.0 | 58.2 | 104.5 | | | 27.2 | 62.6 |
| 243 | 110.5 | 61.9 | 104.7 | 73.9 | | | | 63.4 | 98.6 |
| 244 | 110.4 | 72.6 | 101.1 | 72.8 | | | | 66.3 | 108.3 |
| 245 | 105.2 | 73.1 | 108.6 | 96. | 124.2 | | | 170.9 | 112.5 |
| 246 | 120.8 | 53.2 | 105.8 | 54. | 109.2 | | | 56.5 | 71.9 |
| 247 | 104.0 | 46.5 | 83.2 | 74.8 | 74. | | | | 59.3 |
| 248 | 115.0 | 53.6 | 102.6 | 84.2 | 103.6 | | | 48.8 | 59.7 |
| 249 | 113.1 | 64.9 | 104.2 | 100.6 | | | | 63.6 | 71.1 |
| 250 | 62.3 | 47.7 | 79.5 | 96.1 | 92.3 | | | | |
| 251 | 128.0 | | 133.5 | 129.3 | 42.6 | | | | 109.8 |
| 252 | 124.4 | 60.7 | 94.2 | 89.2 | | | | | 83.1 |
| 253 | 77.0 | 45.4 | 50.8 | 39.2 | 65.1 | | | | 53.1 |
| 254 | 53.5 | 26.9 | 43.9 | 30.6 | 65.3 | | | | 48.2 |
| 255 | 63.5 | 37.8 | 56.8 | 42.4 | 54.2 | | | | 67.7 |
| 256 | 104.6 | 69.3 | 92.4 | 78.7 | | | | | 119.5 |
| 257 | 72.1 | 48.8 | 57.3 | 50.9 | | | | | 68.2 |
| 258 | 97.1 | 53.5 | 66.8 | 61.9 | 126.7 | | | | |
| 259 | 46.8 | 29.1 | 39.8 | 34.6 | 78.0 | | | | |
| 260 | 48.3 | 19.5 | 30.6 | 26.4 | 60.9 | | | | |
| 261 | 69.2 | 33.8 | 48.1 | 42.2 | 63.2 | | | | |
| 262 | 116.2 | 59.7 | 74.0 | 59.8 | 97.8 | | | | |
| 263 | 97.3 | 54.5 | 62.9 | 59.1 | 66.5 | | | | |
| 264 | 117.9 | 48.2 | 59.4 | 62.8 | 64.6 | | | | |
| 265 | 141.2 | 69.2 | 79.1 | 69.2 | 87.0 | | | | |
| 266 | 131.1 | 63.8 | 73.5 | 61.8 | | | | | |
| 267 | 96.6 | 48.3 | 62.7 | 73.4 | 65.1 | | | | |
| 268 | 81.2 | 39.0 | 71.8 | 67.2 | 37.7 | | | | |
| 269 | 63.5 | 34.5 | 71.6 | 67.9 | 39.1 | | | | |
| 270 | 124.1 | 69.7 | 104.5 | 94.7 | 120.6 | | | | |
| 271 | 135.3 | 68.0 | 93.9 | 93.6 | | | | | |
| 272 | | 37.3 | 93.9 | 85.9 | 110.5 | | | | |
| 273 | 101.6 | 56.1 | 83.9 | 69.5 | 99.4 | | | | |
| 274 | 85.6 | 36.1 | 41.2 | 36.9 | | | | | |
| 275 | 83.1 | 38.3 | 43.6 | 44.6 | 72.6 | | | | |
| 276 | 65.5 | 57.1 | 44.1 | 46.2 | | | | | |
| 277 | 66.1 | 36.1 | 41.3 | 38.9 | 71.8 | | | | |
| 278 | 73.4 | 18.7 | 43.3 | 38.1 | 44.1 | | | | |
| 279 | 69.2 | 34.1 | 40.6 | 38.8 | 43.5 | | | | |
| 280 | | 50.6 | 87.4 | 80.0 | 71.0 | | | | |
| 281 | 186.8 | 83.1 | 89.3 | 74.9 | 93.5 | | | | |
| 282 | | 53.7 | 45.8 | 46.1 | 93.5 | | | | |
| 283 | 119.5 | 48.5 | 45.8 | 41.5 | 41.5 | | | | |
| 284 | 86.9 | 36.3 | 27.8 | 24.7 | | | | | |
| 285 | 139.0 | 66.4 | 67.4 | 63.8 | | | | | |
| 286 | 103.8 | 50.1 | 45.2 | 42.4 | | | | | |
| 287 | 169.9 | 96.8 | 86.7 | 70.2 | 128.1 | | | | |
| 288 | | | | | 111.1 | | | | |
| 289 | | | | | 86.5 | | | | |

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                        NO2 MONITORING METHOD COMPARISON -- DAILY DATA LISTING

    *************************************** SITE#002     ****************************************
    DAY     FRMP    TEAP    CHMP    CHMC    CHEMSBC   TGSC    TECH    TECA    CHEM

     15                                                                        29.0
     16                                                                37.9    40.9
     17                                                                        27.9
     18                                                                27.1
     19                                                                60.0    61.1
     20                                                                32.3    36.1
     21                                                                        28.9
     22                                                                        31.1
     23                                                                        31.6
     24                                                                        17.7
     25                                                                        52.9
     26                                                                        34.7
     27                                                                        36.9
     28                                         30.9                   46.5    37.9
     29     63.2    35.3    51.1    50.6        34.6                   73.4    55.8
     30     93.1    34.8    49.3    42.8        41.3                           61.1
     31     81.2    28.0    34.6    30.8        67.1                   59.8    54.3
     32     82.4    25.6    33.3    32.4        55.7                           43.6
     33     63.1    18.1    24.7    25.6        62.4                   46.5    30.9
     34     48.5    17.2    24.6    21.9        39.8                   23.5    28.3
     35     45.6            18.4    21.3         6.2                           23.0
     36     82.2    29.0    36.9    37.4        22.2                   45.5
     37     50.1    14.8    19.3    23.1        28.4
     38     25.3     7.5    11.9    10.8        46.1                   15.0
     39     43.1    12.2    18.8    18.4        18.6                   23.0
     40     45.8    12.9    17.3    15.9        34.7                   23.6
     41     53.4    18.5    22.7    20.5        49.9                   30.9
     42     56.5    19.5    21.8    21.8         8.7                   26.7
     43     44.6    18.7    21.4    20.0        14.9                   26.7    25.6
     44     49.3    20.8    20.9    18.9        31.0                   24.2    25.6
     45     32.1    15.9    17.4    16.9        22.7                   19.5    25.3
     46     78.0    51.3    45.2    39.1        41.1                   45.8    40.7
     47     72.8    22.5    15.8    26.1        27.2                   34.9    39.7
     48     66.3    31.8    28.5    27.6        64.9                   44.8    43.5
     49     35.3    23.4    15.8    23.3                               43.8    35.4
     50     45.8    32.9    31.9    40.0        34.6                   38.2    46.6
     51     56.1    44.5    45.6    53.2        59.7                   71.8    85.4
     52     68.3    43.6    42.4    47.8                               49.6    63.3
     53     45.0    32.3    33.9    32.7        36.8                   56.8    61.4
     54     35.3    29.2    30.4    26.8        34.7                   36.4    49.4
     55     48.2    20.9    20.2    21.6        44.1                   54.3    30.7
     56     28.2    15.5    17.3    22.7        21.2
     57     50.0    27.3    37.9    31.9        24.8
     58     63.5    26.6    36.6    35.9        33.3                   42.4
     59     65.1    31.3    38.5    39.4        27.8                   39.0
     60     93.7    59.6    91.4    76.7        51.6                   67.3
     61    117.9    52.0    75.6    47.5        36.1                   80.8
     62     67.1            48.0    43.1        37.5                   50.0
     63     69.5    36.0    44.4    43.2        28.5                   48.8
     64     78.2    46.9    56.9    55.6        41.9                           82.2
     65     49.9    15.8    19.1    18.8        59.8                           29.7
     66             35.1    34.6    28.7        43.7                           58.1
     67     57.1    27.7    27.9    28.1        16.4                           34.6
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                       NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

   ------------------------------------ SITE=002      ----------------------------------

   DAY    FRMP    TEAR    CHRP    CHRC   CHESBC    TGSC    TECH    TECA    CHEM

    68    62.5    37.8    43.3    36.9    65.7                             76.6
    69    41.5    34.3    28.9    32.7                             53.6    56.0
    70    46.3    34.6    36.2    30.0    57.1                     50.1    67.2
    71    56.1    35.3    44.4 [illegible] 76.6                    54.9    69.4
    72    27.4    22.2    24.4    27.1    58.9
    73    51.0    33.4    37.1    38.0 [illegible]
    74    37.7    30.9    33.8    35.2                             30.8    53.1
    75    32.1    21.9    23.4    29.8    31.3                             45.7
    76    27.4    22.1    26.0    28.1    27.3                             58.3
    77    60.2    42.6    46.2    48.0    37.2                     66.9    54.3
    78    65.2    36.1    42.9    40.2    46.8                     56.0    36.9
    79    41.6    25.3    27.9    29.2    18.6                     40.7
    80            17.4    17.5            17.6                     28.7
    81    53.4    35.7    35.4    39.6                                     42.8
    82    48.2    28.0    36.0    34.7    28.8                     68.3    28.9
    83            27.7    30.6    28.0    55.8                     61.3    23.0
    84    62.0    37.7    44.1    39.2    37.5                     61.0
    85   110.7    50.1    61.2    50.9    40.7    45.2             79.9    65.1
    86    67.6    25.6    36.6            38.5    25.0             44.7    33.8
    87    25.0    14.8    27.2    18.2    24.7    14.3             35.4    30.5
    88    35.2    17.4    23.1    22.4    10.4    17.7                     29.1
    89    55.8    24.4    37.5    28.7    29.6    21.9             39.4    37.6
    90    69.2    30.5    44.7    35.4    50.5    29.8             62.2    44.3
    91    39.4    19.9    35.5    21.8    15.4    20.5             37.0    27.8
    92    52.5    22.1    30.4    34.0    31.9    47.6             40.0    30.0
    93    62.3    34.7    43.5    43.4    29.5    56.9             53.1    42.8
    94    50.1    30.8    32.1    40.7    27.4    63.5             53.4    49.3
    95    62.3    41.7    46.5    49.9    41.0    72.9                     53.2
    96    64.2    38.0            48.0    42.9    74.2                     52.4
    97    96.5    62.6    71.6    70.4    79.7   106.7            100.2    89.8
    98    96.0    54.7    60.9    63.3    68.2                     72.6    67.2
    99    76.5    40.1    51.2    42.4    54.5    57.7             52.6    53.0
   100    59.0    25.2    38.1    29.4    57.7    51.0             45.6    36.3
   101    57.3    27.6    33.9    31.4            53.7             55.4    46.9
   102    57.3    24.4    34.1    30.1    55.5    47.1             48.7    38.0
   103    51.5    28.0    38.4    60.5    41.4    52.4             52.7    30.3
   104    73.6    31.6    40.5    38.9    36.2    56.0             58.6    60.5
   105    74.7    30.2    38.0    34.5    34.7    54.4             53.1    52.7
   106    61.0    43.2    42.2    40.7            34.3             60.4    56.4
   107    88.1    38.4    36.2    32.4    42.4                             60.2
   108    60.7    30.8    35.9    28.0    78.0    27.5             37.1    55.7
   109    70.4    45.8    40.5    37.6   131.7    33.9             45.3
   110    90.7    44.6    58.6    41.3    79.7    41.5             54.1
   111    57.7    27.7    26.9    21.8    15.4    20.4                      8.8
   112    78.4    40.3    38.0    39.4    46.0    39.0             54.5    68.9
   113    76.3    37.9    39.3    48.9    41.1    33.7             40.3    32.1
   114    52.0    27.5    32.0    37.3    38.9    23.4             32.3    44.8
   115    53.8    22.9    22.1    34.7    40.6    21.0                     39.3
   116    53.9    22.5    25.1    28.9    46.1    21.4             34.7    43.6
   117    74.6    37.6    48.4    58.1    51.1    33.0             53.5    15.7
   118    75.8    39.4    48.8    53.6    61.4    38.4             59.5    66.8
   119    85.5    46.2    52.0    59.5    86.2    44.5                     82.4
   120    84.0    41.1    45.8    45.3   127.8    34.2             52.9    73.9
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                      NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

 ************************************ SITE#902     ****************************************

 DAY    FRMP    TEAP    CHRP    CHRC    CHLSBC    TGBC    TECH    TEC4    CHEM

 121    85.0    48.1    51.9    46.9    118.1     39.2            59.5    75.7
 122    90.2    32.7    36.7    35.4     76.1     26.5            52.2    68.4
 123    91.6    42.3    42.0    40.6              31.8            45.8    69.9
 124   100.9    39.8    38.8    34.0              28.5            35.2    56.1
 125    66.3    33.0    32.1    31.2     81.2     23.3                    48.9
 126    66.3    37.8            31.8     63.4                             60.0
 127                                     46.0                             11.7
 128                                    112.2                             35.0
 129                                     97.9                             43.6
 130                                     77.5                             44.9
 131                                                                      28.3
 132                                     77.7                             38.4
 133                                     62.8
 134    52.1    28.1    31.1    28.9     70.3     24.8                    37.7
 135    85.9            37.3    34.7     62.6     25.0                    47.5
 136    61.6    25.8    33.3    29.4     44.9     18.8                    40.7
 137    67.1    34.9    41.1    36.8     36.3     25.9                    64.0
 138    44.9    25.2    32.7    26.1     68.2     19.6                    51.7
 139    64.6    32.7    39.8    34.4     53.6     27.5                    40.9
 140    63.8    39.9    37.9    36.5     28.0     27.8                    51.7
 141    82.1    39.1    47.8    39.8     63.0                     56.6
 142    58.7    28.8    33.9    27.6     41.6     25.8            50.5
 143    60.9    26.7    30.9    26.7     16.9     22.1            37.5
 144    95.9    49.2    53.3    45.5     23.6     37.1
 145    41.9    39.7    44.8    40.0     52.9     33.0
 146    76.1    41.7                     84.6     32.9
 147    72.7    37.1    41.2    41.2     71.5                     60.1
 148    50.2    27.3    28.8    39.1     73.8     30.9            41.4
 149    35.9    15.8    23.8    22.9              13.8            28.2
 150    46.7    24.8    30.5    26.9              19.0            40.9
 151    58.4    32.4            34.6              28.7
 152    70.6    29.6    33.2    33.9              23.6
 153    70.8    39.7    47.2    42.1    109.7     33.0
 154    63.0    30.3    36.0    39.2     46.3     26.6
 155   101.0    81.0    89.1    77.6    106.8     58.9
 156    67.8    35.2    53.6    44.8     66.1     32.0
 157    61.8    29.2    36.9    30.9              23.3
 158   108.3            47.1             51.9     27.4
 159    52.3    23.4    33.3    27.6     58.4     22.8
 160    58.9    32.6    43.1    37.8     46.9     31.4
 161    58.2    21.1    35.8    27.1     58.8     22.8
 162   127.9    47.5    37.1    52.8     73.5     26.5
 163   109.0    43.2    33.5    43.6              22.1
 164    96.5    51.8    35.4    55.9     38.0     23.5
 165   141.3    57.8    42.0    47.2
 166   126.6    44.1    28.8    22.7              15.1
 167   200.3    54.8    40.1             65.2     27.0
 168   219.8    54.9    35.8             53.1
 169    50.9    15.5    30.4    36.4              20.0
 170    66.1    30.1    33.3    37.3              20.1
 171    69.2    25.9    32.0    35.5     29.5     23.0
 172    99.5    47.6    49.3    43.3              41.5
 173    57.6    29.9    33.5    36.2              25.5
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                      NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

-------------------------------------- SITE=902      ----------------------------------------

DAY     PRMP    TEAP    CHRP    CHRO   CHEBSC    TGSC    TECH    TEC4    CHEM

174     53.1    23.8    26.1    26.0     43.0    15.3
175     45.5    23.3    30.4    23.9             19.7
176     61.7    27.8    27.8    27.1     55.0    19.3
177     51.8    24.1    28.0    27.3     71.1    20.3
178     32.2    22.8    25.5    24.0     82.7    17.0
179     46.2    19.0    26.4    22.7    101.4    14.3
180     73.9    35.5    40.8    37.1             28.3
181     95.9    62.3    65.5    52.9    177.2    42.1
182     85.4    40.3    46.5    41.2     74.1    35.0
183     91.2    36.0    48.5    54.7    130.3    30.4
184     48.7    22.7    24.8    30.4    116.1    20.2
185     68.0    29.1    42.7    39.8             22.3
186     94.7    51.1    61.4    64.1             34.0
187     92.3    36.9    46.8    51.6     41.3    29.6
188             24.7    28.9    32.9     27.9    19.5
189     61.1    23.9    33.1    37.1     33.5    22.0
190     65.2    28.4    43.1    51.5             25.5
191     60.5    30.9    35.9    48.9        *    25.9
192     61.7    27.4    35.2    44.2     55.8    27.8
193     76.2    36.1    48.9    61.3             35.6
194     63.0    30.9    42.0    53.8     52.5    32.4
195     85.2            50.7    56.5     48.1    36.1
196     80.3    41.6    50.4    63.8             37.6
197    106.6                    58.0             39.6
198     84.4    38.7    52.5    51.2             24.7
199     58.2    22.1    30.7    36.8     62.4    23.7
200     92.0    36.6    48.0    49.4             34.0
201     95.3    45.1    58.2    50.2    101.0    41.0
202     66.8            41.8             61.5    29.1
203     60.0    23.6    29.5    30.1     40.8    21.6
204     95.8    40.3    49.1    49.3    131.2    35.2
205     55.3    25.1    30.6    28.9    103.1    20.1
206     67.7    22.6    24.8    28.8     13.0    17.3
207     46.0    17.6    22.4    23.3             14.1
208     57.2    31.6    36.6    36.0     44.6    24.1
209     88.6    62.5    55.9    66.1     87.6    35.2
210    115.7    68.7    78.5    75.1             41.7
211    104.9    50.9    80.2    62.5             50.4
212     93.3            39.5    31.4             28.4
213     28.8    21.3    35.3    26.5             24.4
215     77.2    37.4    56.4    47.2     72.7    35.8
216     53.2    29.6    44.5    36.8     38.7    28.0
217     64.9    30.1    46.6    40.5             31.2
218     41.7    21.9    28.2    24.4
219    122.6    50.7    66.6    55.6     81.9
220     86.7    39.1    53.6    46.1     78.8
221     91.9    34.7    48.0    34.9    109.1
222             32.1    41.1
223     56.3    21.7    33.6    30.9     63.1
224     81.7    41.4    45.3    46.5
225    120.3    88.8            83.3    185.1
226     80.2    41.4    70.4    54.5     78.3
227     90.0    25.3    57.4    53.2     74.9
```

## NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

---------------------------------------- SITE#902 ----------------------------------------

| DAY | FRMP | TEAF | CHRF | CHRO | CHESSC | TGSC | TECH | TECH | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| 228 | 84.8 | 35.9 | 72.7 | 56.0 | 61.3 | | | | |
| 229 | 75.3 | 30.6 | 59.5 | 52.8 | 195.2 | | | | |
| 230 | 48.1 | 22.2 | 39.2 | 42.8 | [illegible] | | | | |
| 231 | 50.3 | 22.1 | 50.0 | 43.6 | [illegible] | | | | |
| 232 | 80.9 | 49.4 | 46.5 | [illegible] | [illegible] | | | | |
| 233 | 72.1 | 32.2 | 58.0 | [illegible] | 93.7 | | | | |
| 234 | 78.8 | 50.7 | 64.6 | [illegible] | 51.9 | | | | |
| 235 | 68.9 | 40.7 | 47.1 | [illegible] | | | | | |
| 236 | 69.6 | 50.3 | 57.8 | [illegible] | | | | | |
| 237 | 74.3 | 45.8 | 63.8 | 58.2 | [illegible] | | | | |
| 238 | 86.4 | 47.3 | 60.0 | 59.2 | [illegible] | | | | |
| 239 | 135.3 | 118.4 | 145.3 | 121.4 | 98.3 | | | | |
| 240 | 80.2 | 52.1 | 78.2 | 73.6 | 72.5 | | | | |
| 241 | 47.0 | 26.8 | 53.4 | 45.4 | | | | | |
| 242 | 78.4 | 27.4 | | 49.1 | 76.5 | | | | |
| 243 | 84.8 | 60.6 | 90.6 | 75.2 | | | | | |
| 244 | 98.6 | 43.2 | 81.2 | 70.1 | 54.4 | | | | |
| 245 | 94.2 | 55.7 | 92.7 | 82.8 | 79.2 | | | | |
| 246 | 121.9 | 57.3 | 100.4 | 86.4 | 87.2 | | | | |
| 247 | 107.1 | 42.9 | 84.5 | 78.2 | 82.2 | | | | |
| 248 | 107.6 | 40.4 | 78.4 | 74.4 | 72.9 | | | | |
| 249 | 226.5 | 51.5 | 99.3 | 86.7 | 61.9 | | | | |
| 250 | 75.1 | 30.9 | 60.0 | 64.1 | 47.8 | | | | |
| 251 | 174.8 | 101.4 | 140.9 | 121.8 | 152.1 | | | | |
| 252 | 96.8 | 38.4 | 68.1 | 66.8 | 14.1 | | | | |
| 253 | 151.5 | 84.0 | 100.8 | 99.6 | 120.1 | | | | |
| 254 | | 18.7 | 24.1 | 24.7 | 40.8 | | | | |
| 255 | 25.0 | 21.0 | 27.9 | 24.5 | 33.6 | | | | |
| 256 | 73.4 | 47.0 | 56.5 | 56.4 | 63.4 | | | | |
| 257 | 56.0 | 34.2 | 43.6 | 43.5 | 53.2 | | | | |
| 258 | 81.8 | 32.8 | 49.2 | 43.5 | | | | | |
| 259 | 41.9 | 25.4 | 41.2 | 32.5 | | | | | |
| 260 | 55.5 | 21.9 | 32.0 | 27.3 | 37.7 | | | | |
| 261 | 66.8 | 27.0 | 43.3 | 35.8 | 39.3 | | | | |
| 262 | 98.1 | 39.6 | 48.0 | 47.2 | 74.9 | | | | |
| 263 | 108.2 | 41.4 | 48.1 | 46.4 | 40.1 | | | | |
| 264 | 113.2 | 43.1 | 88.1 | 52.7 | | | | | |
| 265 | 128.3 | | 68.0 | 65.9 | | | | | |
| 266 | 87.9 | 42.4 | 51.3 | 49.3 | | | | | |
| 267 | 99.3 | 40.5 | 67.9 | 62.5 | 49.8 | | | | |
| 268 | 80.8 | 28.6 | 58.2 | 44.9 | 47.4 | | | | |
| 269 | 64.5 | 31.7 | 57.1 | 46.7 | 33.5 | | | | |
| 270 | 122.9 | 57.7 | 91.8 | 102.5 | 25.4 | | | | |
| 271 | 67.9 | 33.2 | 58.8 | 49.8 | 44.6 | | | | |
| 272 | 89.4 | 44.8 | 76.6 | 67.8 | 45.6 | | | | |
| 273 | 68.9 | 49.0 | 71.9 | 66.7 | 61.1 | | | | |
| 274 | 65.2 | 30.2 | 32.9 | 32.4 | | | | | |
| 275 | | 26.1 | 33.3 | 28.8 | 49.2 | | | | |
| 276 | 40.0 | 19.0 | 20.8 | 22.1 | | | | | |
| 277 | 62.6 | 32.5 | 42.6 | 36.9 | | | | | |
| 278 | 64.1 | 30.8 | 42.5 | 35.9 | 45.7 | | | | |
| 279 | 49.9 | 29.1 | 35.1 | 32.7 | 38.9 | | | | |
| 280 | 110.4 | 52.5 | 60.2 | 59.8 | 54.8 | | | | |

```
                    NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

     ************************************** SITE=902      ****************************************

     DAY     PAMP     TEAP     CHPP     CHPC     CHE8BC    TOSC     TECH     TEC4     CHEM

     281    136.5     78.8     73.1     70.9      85 0
     282    111.2     52.4     69.4     38.8
     283     93.7     37.2     38.8     32.5
     284     72.7     31.7     22.8     20.9
     285     88.0     58.0     49.8     49.8
     286     80.9     44.4     47.8     40.2
     287    122.0     72.0     58.2     63.8
     288                                             2.
     289                                           26.7
     290                                           27.2
     291                                           67.9
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                          NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

     ************************************** SITE=831     ****************************************

     DAY     FRMP    TEAF     CHMF     CHRC    CHEDSC    TGSC    TECH    TEC4     CHPM

       3                                                                          53.3
       4                                                                          62.7
       5                                                                          74.7
       6                                                                          70.7
      12                                                                          98.0
      13                                                                          52.5
      14                                                                          40.8
      15                                                                 27.1     25.4
      16                                                                 37.1     26.8
      17                                                                 35.7     37.9
      18                                                                          35.7
      19                                                                          42.0
      20                                                                          23.0
      21                                                                          31.5
      22                                                                          44.0
      23                                                                          65.2
      24                                                                          62.9
      25                                                                          64.1
      26                                             73.0                         80.5
      27                                             98.0
      28                                             41.8                         98.5
      29     29.9    15.3     74.2     87.5          60.2                        100.9
      30    109.6    53.2     73.8     68.5                                       66.4
      31    101.8    38.7     24.7      7.6          27.6
      32    157.0    73.5     87.4     82.8          99.0                         79.2
      33     86.8    37.5                            71.7                         47.5
      34             11.5              18.6          39.9
      35     66.9    19.8              34.2          67.1
      36    101.3    53.0     60.8     61.2          52.0
      37    165.1    70.8     85.5     70.7          78.6
      38     71.5    36.4     47.8     45.9                                  59.2     51.0
      39     55.8    30.4     39.9     34.9                                  50.0     35.1
      40     60.8    26.2     30.6     31.1          28.3                    51.1     32.7
      41     73.5    20.3     37.4     32.4          40.9                    49.9     31.6
      42     63.3    28.6     36.1     38.5           9.4
      43     11.1    17.2     21.8     17.1           8.1
      44     44.0    37.2     34.4     34.7          35.4
      45     28.4    28.1     25.6     27.2          27.3
      46     26.4    33.3     32.6     29.1           9.1
      47                                             42.5                    78.1     39.7
      48     62.2    47.3     58.9     55.5          43.0                    72.8     44.3
      49     15.1    25.3     29.3     25.1          26.6
      50     44.3    28.8     32.4     38.8          29.2                             23.7
      51     47.6    39.4     44.4     53.2          41.3
      52     45.5    84.7     93.3                   67.5                             93.9
      53     95.8             93.3                   96.6
      54     77.4    69.0     60.6     77.1          62.4
      55     34.9    18.0     27.1     29.5          47.3
      56     21.2    17.3     20.4     23.4          17.3
      57                                             39.9
      58     93.6    52.9     71.1     59.8          38.2
      59    113.6    56.2     75.5     69.4          72.2
      60    159.9            105.4    134.5          96.7
```

NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

-------------------------------------- SITE=831 --------------------------------------

| DAY | FRMF | TEAF | CHRF | CHRC | CHEBSC | TGSC | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| 61 | 132.8 | 86.4 | 119.5 | 105.6 | 58.[illegible] | | | | |
| 62 | 80.0 | | | | 60.6 | | | | |
| 63 | 93.6 | 50.6 | 64.7 | 40.6 | 49.7 | | | | |
| 64 | | 50.2 | 50.4 | [illegible]0.6 | 47.3 | | | | |
| 65 | 57.6 | 53.8 | 41.9 | 50.7 | 22.[illegible] | | | | |
| 66 | 115.9 | 93.2 | 83.1 | 84.1 | 94.2 | | | | |
| 67 | 49.8 | 46.9 | 49.2 | 44.7 | 34.2 | | | | |
| 68 | | 22.6 | 22.7 | 30.6 | 26.3 | | | | |
| 69 | 18.2 | 15.6 | 21.4 | 18.6 | 38.0 | | | | |
| 70 | 31.4 | 33.5 | 21.3 | 22.5 | 20.4 | | | | |
| 71 | | | 52.2 | 57.6 | 118.3 | | | | |
| 72 | | | | 36.5 | 65.0 | | | | |
| 73 | 41.9 | | 34.8 | | 79.8 | | | | |
| 74 | 57.9 | | 56.0 | | 76.9 | | | | |
| 75 | 70.5 | 64.7 | 76.8 | 77.6 | | | | 116.7 | 91.0 |
| 76 | 75.9 | | | 50.5 | 99.3 | | | 111.7 | |
| 77 | | 69.4 | 60.7 | 64.1 | 83.9 | | | 110.9 | |
| 78 | 75.7 | | | | 97.2 | | | 103.3 | |
| 79 | 89.4 | 67.4 | 73.4 | 63.9 | 70.6 | | | 107.3 | |
| 80 | 51.6 | 40.0 | | 43.5 | 79.9 | | | 79.9 | 80.2 |
| 81 | 37.4 | 37.6 | 37.9 | 41.5 | 86.3 | | | 63.6 | |
| 82 | 72.0 | 60.3 | 50.8 | 53.6 | 69.6 | | | 136.4 | 85.6 |
| 83 | | | | 133.5 | 134.5 | | | | |
| 84 | 129.5 | 91.0 | 124.1 | | 127.8 | | | | |
| 85 | | | | | 61.4 | | | | |
| 86 | 19.4 | 15.4 | 19.5 | 16.5 | 16.2 | 16.3 | | | |
| 87 | 64.2 | 42.2 | 67.7 | 42.7 | 46.5 | 31.0 | | | |
| 88 | 69.1 | 48.0 | 60.0 | | 43.3 | 45.9 | | | |
| 89 | | 45.3 | 70.7 | | 13.3 | 46.4 | | 262.1 | |
| 90 | 95.6 | 53.7 | 71.6 | 52.2 | 63.8 | 51.2 | | 79.7 | |
| 91 | 112.9 | 59.1 | 57.3 | 54.0 | 69.5 | 86.4 | | 80.3 | |
| 92 | | | | | 85.0 | | | 134.7 | |
| 93 | | | 71.5 | | 81.1 | 108.6 | | 120.7 | |
| 94 | | 32.4 | 32.6 | 38.9 | 35.1 | | | 55.2 | |
| 95 | 69.7 | 37.0 | 40.7 | 46.0 | 62.3 | 68.4 | | 50.9 | |
| 96 | 79.3 | 52.2 | 53.6 | 61.8 | 35.5 | 84.3 | | 85.9 | |
| 97 | 125.7 | 66.0 | 67.2 | 75.4 | 97.2 | 112.6 | | 98.6 | |
| 98 | 106.6 | | 89.9 | 89.5 | 73.8 | 103.1 | | | |
| 102 | | | | | | | | | 59.8 |
| 103 | | | | | | | | | 82.9 |
| 104 | | | | | | | | | 85.4 |
| 105 | | | | | | | | | 110.8 |
| 106 | | | | | | | | | 65.2 |
| 168 | | | | | 38.3 | | | | |
| 176 | | | | | 70.8 | | | | |
| 179 | | | | | 42.2 | | | | |
| 180 | | | | | 196.3 | | | | |
| 181 | | | | | 118.5 | | | | |
| 183 | | | | | 77.1 | | | | |
| 184 | | | | | 57.8 | | | | |
| 185 | | | | | 48.6 | | | | |
| 186 | | | | | 44.8 | | | | |
| 187 | | | | | 78.5 | | | | |

```
                    NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

  ---------------------------------------- SITE=831      ------------------------------------------

  DAY    PRMF    TEAF    CHRF    CHRC    CHEBSC   TGSC    TECH    TECQ    CHEM

  188                                       3.5
  189                                      66.3
  190                                      62.[illegible]
  191                                     118.5
  192                                      83.3
  193                                      93.8
  194                                      71.3
  195                                      58.6
  196                                     107.2
  197                                      93.4
  198                                     143.9
  199                                      14.1
  200                                      23.7
  203                                      17.4
  204                                      37.5
  205                                      68.4
  206                                      28.3
  207                                      31.1
  208                                      27.3
  209                                      48.3
  210                                      31.6
  211                                      25.8
  212                                      38.6
  213                                      35.9
  214                                      33.2
  215                                      35.0
  217                                      19.8
  218                                      30.5
  219                                      36.8
  220                                      22.0
  221                                      51.5
  222                                      27.5
  245                                      47.2
  246                                      38.1
  247                                      29.9
  248                                      46.6
  249                                      41.7
  250                                      22.5
  252                                      21.9
  255                                      46.2
  256                                      35.8
  258                                      60.4
  260                                      52.9
  261                                      39.0
  262                                      11.7
  263                                      91.2
  264                                      29.3
  265                                      36.0
  271                                      40.2
  272                                      35.0
  273                                      61.8
  276                                      56.4
  277                                      45.8
```

```
                         NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

      ------------------------------------ SITE=831      ----------------------------------

      DAY   FRMF   TEAF   CHPF   CHRC   CHESSC   TGSC   TECH   TEC4     CHEM

      278                                 81.8
      279                                 2
      280                                 57.1
      281                                 32.9
      282                                 66.6                         150.2
      283                                 73.7                         154.8
      284                                 61.[illegible]                         234.0
      285                                                              121.6
      286                                                              119.6
      288                                 63.7
      289                                 81.4
      290                                 50.7
      291                                 79.3
```

```
NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

****************************************** SITE=832     ******************************************

 DAY      FRMF      TEAF      CHRF      CHRC    CHESSC      TGSC      TECH      TEC4      CHEM

  26                                              87.4                                   130.7
  27                                              27.2                                   135.8
  28                                       [illegible]                                   180.4
  29                                       [illegible]                                   155.1
  30                                              85.8                                   113.0
  31                                              48.9
  32                                              76.1                                   135.7
  33                                              34.5
  34                                       [illegible]
  35                                       [illegible]
  36                                              85.3
  37                                              66.1
  38                                              15.4                                    59.8
  39                                              18.7                                    56.8
  40                                              28.3                                    36.7
  41                                              41.3                                    37.6
  42                                              19.4                                    42.5
  43      12.3      14.1      14.0                11.2                                    17.5
  44      67.8      77.1      36.0      36.4      26.1                                    46.0
  45      41.8      19.6      24.8      19.2      25.3                                    25.1
  46      49.3      28.9      32.2      31.8      39.9                                    41.8
  47      41.8      44.6      39.9      32.8       7.2
  48      51.0      26.9      51.5                34.5
  49      38.6      21.2      30.9      25.9      37.2
  50      28.8      23.7      27.5      34.0      66.6
  51                                    34.4      86.2                                    55.7
  52      68.3                                    50.9                                   134.5
  53      70.2                50.2      52.9                                   148.3     126.3
  54     100.9      43.8      44.1      44.7      99.9                                   135.6
  55      51.6      19.4      22.0      28.4      38.5                                    35.1
  56                                              14.5                          79.7
  57      43.9      13.3      25.8      14.8      41.0
  58      81.0      40.0      49.1      55.5      72.1
  59      88.3      47.5      58.6      57.3      41.9
  60     143.9               125.2     140.7      85.7
  61     164.3               117.3     116.1      79.2
  62      90.8      51.0      65.8      68.5      44.5
  63      80.4      45.0      67.9      58.7      57.3                                    68.5
  64      66.9      48.2      47.6      41.3      59.4
  65       9.0                39.1      36.2      37.1                                    71.9
  66     106.6      86.6      78.5                78.8
  67      64.6      49.4      48.8                56.4
  68                18.0      18.6      18.5      45.1                          30.8      22.0
  69      32.0      19.4      20.9      19.9      36.2                          37.6      26.5
  70      27.2      19.3      20.0      16.0      33.5                          42.2      28.8
  71                37.8      40.9                97.5                          82.7      71.1
  72                                    44.6      93.0                          81.5      69.4
  73      43.6                35.8      30.7      82.6                          67.7      56.0
  74                          39.5      42.0      52.3
  75      88.8                65.5      62.9      73.3                         107.4      98.2
  76      82.8      31.8      55.5      57.5      63.3                         108.2     100.7
  77      85.7      69.4                68.4      68.9                         118.1     112.6
  78      86.7      57.1      60.4                52.8                         108.0      99.1
```

1

NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

---------------------------------------- SITE=832 ----------------------------------------

| DAY | FRMF | TEAF | CHRF | CHRC | CHESSC | TGAO | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| 79 |  | 8.2 | 56.2 | 49.8 | 75.7 |  |  | 115.8 | 105.4 |
| 80 | 6.9 | 36.4 | 26.1 |  | 39. |  |  | 80.0 | 76.2 |
| 81 | 62.7 | 18.6 | 30.2 | 32.1 | 45.9 |  |  |  |  |
| 82 | 57.3 |  | 31.1 | 19.2 | 59.2 |  |  | 50.3 | 44.3 |
| 83 | 112.0 | 79.2 | 79.1 |  | 52.0 |  |  | 209.1 | 210.6 |
| 84 | 164.1 | 48.9 | 126.0 | 114. |  |  |  |  |  |
| 85 | 71.8 | 22.6 | 46.6 | 31.5 |  | 28.4 |  | 72.5 | 65.9 |
| 86 | 37.2 | 12.3 | 26.0 | 22.8 | 17. | 21.6 |  | 45.3 | 34.8 |
| 87 | 75.3 | 12.7 |  | 41.3 | 46.7 | 30.7 |  | 78.1 |  |
| 88 | 79.4 | 28.1 | 68.0 | 53.8 | 29.1 | 40.8 |  | 96.5 |  |
| 89 | 69.0 | 3.3 | 47.6 | 48.8 | 24.9 | 11.6 |  | 103.6 | * |
| 90 | 92.9 | 1.3 | 55.9 | 47.1 | 48.9 | 32.2 |  |  |  |
| 91 | 151.8 | 17.3 | 66.0 | 41.5 | 65.1 | 93.4 |  |  |  |
| 92 |  | 41.0 | 68.7 | 89.6 | 85.2 |  |  | 169.9 |  |
| 93 | 95.2 | 13.2 | 47.5 | 52.2 | 32.9 | 69.5 |  | 94.6 |  |
| 94 | 58.9 | 21.2 | 29.9 | 36.0 | 38.4 | 54.3 |  | 54.0 |  |
| 95 | 84.7 | 28.0 | 30.4 | 35.2 | 43.2 | 53.3 |  | 64.0 |  |
| 96 |  | 30.6 | 29.8 | 39.9 | 86.1 | 61.4 |  | 89.1 |  |
| 97 | 177.8 | 52.9 | 46.4 | 45.8 | 62.8 |  |  | 103.9 |  |
| 98 | 111.5 | 48.7 | 47.6 |  | 61.2 |  |  |  |  |
| 99 | 95.1 |  | 29.6 | 44.2 | 29.9 | 48.2 |  |  |  |
| 100 | 75.7 | 17.7 | 20.4 | 25.4 | 36.0 | 32.9 |  | 93.4 | 85.3 |
| 101 | 75.7 |  | 31.8 | 28.9 | 67.8 | 45.1 |  | 99.5 | 88.6 |
| 102 | 90.2 | 26.0 | 44.4 | 30.5 | 48.1 |  |  | 82.5 | 73.4 |
| 103 | 116.3 |  | 35.4 | 32.4 | 115.0 | 55.4 |  | 102.4 | 85.4 |
| 104 | 104.0 | 30.9 | 40.1 | 34.7 | 46.9 | 55.9 |  |  |  |
| 105 | 114.5 | 48.5 | 62.1 |  | 36.8 | 59.6 |  | 124.0 | 97.9 |
| 106 | 94.7 | 43.3 | 39.1 | 31.9 | 55.4 | 31.2 |  |  | 62.5 |
| 107 | 94.1 | 36.6 | 40.6 | 31.1 | 81.2 | 30.3 |  | 110.8 | 60.8 |
| 108 | 100.6 | 31.0 | 41.3 | 34.1 | 88.4 | 30.9 |  | 77.6 | 64.6 |
| 109 | 139.6 | 58.8 | 59.2 | 56.2 | 133.0 | 48.7 |  | 118.8 | 104.7 |
| 110 | 176.7 | 63.3 | 67.1 | 59.4 | 60.9 | 59.7 |  | 153.8 | 137.3 |
| 111 | 69.7 | 37.6 | 42.0 | 36.4 | 80.3 |  |  | 74.4 | 72.6 |
| 112 | 106.2 | 37.9 | 40.2 | 27.2 | 25.3 | 31.2 |  | 75.5 | 76.6 |
| 113 |  |  | 35.8 |  | 80.0 |  |  |  |  |
| 114 |  | 38.6 |  | 52.0 | 79.3 |  |  | 76.7 | 44.8 |
| 115 | 134.7 | 99.7 | 113.8 | 116.8 | 97.3 | 107.2 |  |  |  |
| 116 | 173.5 | 71.2 | 63.8 | 87.5 | 300.7 | 66.8 |  |  |  |
| 117 | 174.7 | 104.3 | 118.8 | 131.1 | 73.4 | 111.4 |  | 116.1 | 143.0 |
| 118 | 207.8 |  | 71.4 | 67.5 | 81.0 |  |  | 147.6 | 141.8 |
| 119 | 145.0 | 65.3 | 69.6 | 73.9 | 131.2 | 58.6 |  | 174.2 | 120.9 |
| 120 | 164.6 |  | 59.9 |  | 127.5 | 47.9 |  |  |  |
| 121 |  | 1.9 | 50.1 | 49.2 | 75.8 | 34.7 |  |  |  |
| 122 | 109.2 | 44.1 | 45.9 | 43.6 | 79.1 | 35.0 |  |  |  |
| 123 | 121.9 |  | 57.3 | 55.8 | 40.2 |  |  |  |  |
| 124 | 128.1 |  | 58.9 | 58.0 | 98.3 |  |  | 149.6 | 98.2 |
| 125 | 176.2 | 68.0 | 63.1 | 62.6 | 87.3 | 51.8 |  |  |  |
| 126 | 214.3 | 93.5 |  |  | 130.8 | 80.8 |  |  |  |
| 127 |  |  |  |  | 164.0 |  |  |  |  |
| 128 |  |  |  |  | 146.8 |  |  |  |  |
| 129 |  |  |  |  | 165.2 |  |  |  |  |
| 130 |  |  |  |  | 303.6 |  |  | 208.1 |  |
| 131 |  |  |  |  | 60.7 |  |  | 94.6 |  |

## NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

SITE=832

| DAY | PRMF | TEAF | CHMF | CHRC | CHESBC | TGSC | TECH | TECA | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| 132 | | | | | 61.7 | | | 115.4 | |
| 133 | | | | | 126.8 | | | | |
| 134 | | | | 42.9 | 94.0 | 39.3 | | | |
| 135 | | 42.6 | 51.8 | 45.2 | [illegible] | 35.0 | | 74.8 | 49.7 |
| 136 | 66.9 | 51.8 | 51.1 | [illegible] | [illegible] | 35.8 | | 77.0 | 49.7 |
| 137 | 102.9 | | 46.5 | | 88.7 | | | 105.2 | 69.8 |
| 138 | 100.4 | | 51.3 | [illegible] | 92.3 | 37.8 | | 96.3 | 69.6 |
| 139 | 75.0 | 39.4 | 40.5 | [illegible] | 54.0 | [illegible] | | 80.5 | 72.4 |
| 140 | 87.4 | 28.5 | 44.9 | | [illegible] | | | | |
| 141 | | 32.4 | 52.9 | | [illegible] | 36.9 | | | 92.2 |
| 142 | 132.1 | 45.3 | 76.4 | 48.7 | [illegible] | 37.5 | | 127.0 | 112.3 |
| 143 | 112.6 | 46.3 | 71.3 | 57.3 | 54.0 | | | 117.9 | 111.8 |
| 144 | 113.9 | | 95.8 | 80.1 | | 61.0 | | | |
| 145 | 164.3 | | 65.6 | 69.3 | 120.7 | 58.0 | | 171.0 | 142.7 |
| 146 | | 34.2 | 32.2 | 32.5 | 60.0 | 31.8 | | 108.7 | 69.3 |
| 147 | 110.0 | | 58.0 | 48.0 | 69.3 | 39.9 | | 92.4 | 93.4 |
| 148 | 161.1 | 55.4 | 79.2 | 73.8 | 136.7 | 52.1 | | | |
| 149 | 216.2 | 101.8 | 118.8 | 108.9 | 152.3 | 104.2 | | 258.0 | |
| 150 | 192.2 | 121.3 | 137.3 | 115.2 | | 108.5 | | 244.2 | |
| 151 | 235.3 | | 139.9 | 129.5 | 231.4 | 115.1 | | 268.2 | 234.8 |
| 152 | 126.8 | 76.6 | 94.0 | 85.6 | 95.7 | 70.7 | | 134.2 | 118.5 |
| 153 | 107.3 | 66.5 | 62.1 | 60.9 | 90.7 | 55.2 | | 99.1 | 91.4 |
| 154 | 165.7 | | 111.8 | 144.2 | 164.9 | 95.9 | | 126.2 | |
| 155 | 245.6 | 133.8 | 163.9 | | 215.1 | 116.9 | | | |
| 156 | 130.6 | 43.3 | 61.5 | 56.8 | | 48.7 | | | |
| 157 | 89.1 | 42.9 | 51.6 | 49.3 | 96.0 | 33.7 | | | |
| 158 | 113.2 | 30.8 | 57.6 | 36.1 | 70.6 | 30.9 | | 81.4 | 61.4 |
| 159 | 107.2 | 44.3 | 51.4 | 56.9 | 88.3 | 33.9 | | 103.4 | |
| 160 | | | | | 65.2 | | | 88.7 | 67.0 |
| 161 | | 26.5 | 41.2 | | | 28.4 | | 91.2 | 59.8 |
| 162 | 136.8 | 52.1 | 40.1 | 53.3 | | 26.2 | | 83.5 | 58.5 |
| 163 | 119.6 | 52.2 | 38.7 | 52.7 | 43.5 | 31.5 | | | 65.3 |
| 164 | 153.6 | 59.3 | 42.4 | 61.6 | 42.6 | | | | |
| 165 | 150.0 | | 61.8 | 62.5 | 52.9 | | | 103.3 | 72.6 |
| 166 | 136.4 | | | 67.5 | 56.7 | 47.9 | | 139.5 | 87.2 |
| 167 | 170.7 | 96.0 | 78.8 | 101.5 | 71.6 | 62.9 | | | |
| 168 | 201.2 | 119.7 | 68.0 | 90.5 | 94.6 | 74.3 | | | |
| 169 | 160.6 | 100.2 | 94.1 | 86.5 | | 62.9 | | | |
| 170 | 167.3 | 98.7 | 115.4 | 96.6 | 154.1 | 74.5 | | | |
| 171 | 199.5 | 122.6 | 139.4 | 113.4 | | 110.5 | | | |
| 172 | 194.9 | 131.3 | 125.6 | 136.2 | | 116.9 | | | |
| 173 | 272.4 | 94.8 | 105.5 | 96.0 | 118.1 | 84.4 | | 238.2 | 162.8 |
| 174 | 143.9 | 111.4 | 128.0 | 121.3 | 150.9 | 81.6 | | | 156.6 |
| 175 | 222.4 | 116.5 | 130.4 | 120.5 | 150.4 | 117.2 | | | |
| 176 | 120.5 | | 53.8 | | 122.6 | 35.0 | | 95.7 | 69.7 |
| 177 | 208.8 | | 156.5 | 157.3 | | 139.4 | | 200.0 | 152.7 |
| 178 | 18.1 | 2.4 | 4.2 | 1.3 | 273.7 | | | | |
| 179 | 40.2 | 18.8 | 25.3 | | 52.8 | 17.4 | | | |
| 180 | | | 88.6 | 65.5 | 188.8 | | | 156.7 | 116.7 |
| 181 | 132.9 | 61.2 | 63.2 | | 221.4 | 43.3 | | 136.6 | 98.3 |
| 183 | 111.4 | | 74.9 | 73.8 | 130.4 | 42.1 | | 120.6 | 85.8 |
| 184 | | 82.2 | 92.2 | 78.9 | 142.8 | 56.1 | | 133.4 | 94.4 |
| 185 | | 25.0 | 39.9 | 48.6 | 34.7 | 24.0 | | 71.2 | 48.3 |

## NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

-------------------------------------------- SITE=832 --------------------------------------------

| DAY | FRMP | TEAP | CHRP | CHRC | CHESSC | TGSC | TECM | TECA | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| 186 | | 43.6 | | 45.8 | 78.4 | 31.8 | | | |
| 187 | 107.5 | 53.4 | 66.5 | 69.3 | 81. | 40.4 | | | |
| 188 | 85.8 | 44.8 | 69.1 | 72.1 | 58.9 | 38.9 | | | |
| 189 | 87.2 | 48.0 | 73.1 | 72.0 | | 43.4 | | | |
| 190 | 124.9 | 61.0 | 105.5 | 104. | 118.9 | 62.6 | | | |
| 191 | 144.4 | 74.4 | 100.4 | 104. | 135.6 | 72.9 | | 129.3 | 97.5 |
| 192 | 101.3 | 49.4 | | | 42. | 42.5 | | 92.9 | 66.6 |
| 193 | 116.2 | 67.5 | 72.2 | 101.2 | [illegible] | 67.7 | | 145.4 | 98.9 |
| 194 | 130.7 | | 69.5 | | 81.5 | | | 107.6 | 68.2 |
| 195 | 167.4 | 85.5 | 110.9 | 104.7 | 112.3 | 69.1 | | 143.3 | 94.3 |
| 196 | 162.0 | | | | 172.7 | 125.4 | | 266.2 | 182.4 |
| 197 | 288.5 | 124.3 | 176.8 | 168.7 | 276.6 | 146.5 | | | 213.3 |
| 198 | 385.9 | 200.5 | 237.2 | 240.4 | 65.7 | 179.7 | | | |
| 199 | 125.2 | 56.1 | 82.2 | 78.7 | | 60.4 | | 131.5 | 106.7 |
| 200 | 110.5 | 42.1 | 67.6 | 70.2 | | 61.0 | | 110.9 | 85.0 |
| 201 | 179.0 | 45.7 | 59.2 | 54.4 | 67.8 | 43.8 | | | |
| 202 | 35.3 | | 49.9 | 66.2 | 93.6 | 37.4 | | | |
| 203 | 74.2 | 35.9 | 48.4 | 52.5 | 30.6 | 31.2 | | | |
| 204 | 77.5 | 42.5 | 48.6 | 53.8 | 130.9 | 37.6 | | | |
| 205 | 99.2 | 55.2 | 67.1 | | 117.2 | 36.5 | | | |
| 206 | 52.0 | 65.5 | 81.2 | 76.6 | | 55.5 | | | |
| 207 | 52.4 | 31.9 | 36.4 | 43.5 | | 22.1 | | 62.6 | 42.9 |
| 208 | 50.8 | 77.7 | 95.9 | 86.5 | 75.5 | 47.5 | | 130.7 | 91.7 |
| 209 | 249.0 | 121.0 | 127.1 | 130.0 | | 94.7 | | 190.0 | 167.8 |
| 210 | 84.4 | 48.9 | 46.0 | | | 30.5 | | 70.0 | 29.8 |
| 211 | | 64.8 | 100.4 | 74.2 | 98.8 | 59.6 | | | |
| 212 | 130.1 | | 111.3 | | 200.6 | 57.9 | | 106.9 | 80.3 |
| 213 | 102.7 | 61.4 | 86.1 | 67.6 | 98.1 | 55.1 | | 74.3 | 55.9 |
| 214 | 93.2 | 61.2 | 89.2 | 72.2 | 196.8 | 58.8 | | | |
| 215 | 135.9 | 70.2 | 101.1 | 84.9 | 69.3 | 67.0 | | | |
| 216 | 103.9 | 48.9 | 84.9 | 68.1 | | 56.8 | | | |
| 217 | 158.3 | | 82.0 | 60.2 | 84.1 | | | | |
| 218 | 113.8 | 54.4 | 55.9 | 62.5 | 80.8 | | | | |
| 219 | 119.8 | 45.1 | 65.8 | 44.0 | 103.1 | | | | 42.8 |
| 220 | 128.1 | 69.8 | 70.6 | 69.8 | 99.3 | | | | |
| 221 | | 65.3 | 63.1 | 66.1 | 111.0 | | | 84.2 | 59.7 |
| 222 | 121.4 | 43.9 | 48.6 | 42.1 | | | | 48.4 | 35.1 |
| 223 | 104.5 | 53.4 | 65.3 | 56.4 | | | | 57.7 | 39.2 |
| 224 | | 57.7 | 71.2 | 52.8 | 88.9 | | | 66.7 | 46.7 |
| 225 | 97.4 | 54.7 | 73.3 | 81.6 | 93.3 | | | 62.2 | 45.3 |
| 226 | 65.0 | 25.5 | 46.2 | 39.9 | 55.8 | | | 27.1 | 16.3 |
| 227 | 89.8 | 30.1 | 60.4 | 50.7 | 49.6 | | | 47.0 | 32.1 |
| 228 | 68.8 | 38.6 | 57.6 | 57.2 | 34.5 | | | 39.5 | 29.0 |
| 229 | 110.5 | 50.2 | 82.6 | | 64.2 | | | | |
| 230 | 104.1 | 41.4 | 50.9 | 58.2 | 36.5 | | | 47.8 | 30.5 |
| 231 | 130.1 | 85.3 | 104.7 | 121.6 | | | | | |
| 232 | 145.8 | 102.7 | 127.6 | 98.6 | | | | 132.4 | 94.5 |
| 233 | | 86.0 | 116.2 | 100.5 | 82.9 | | | 112.6 | 81.4 |
| 234 | 128.7 | 85.4 | 103.8 | 76.2 | 182.7 | | | 115.3 | 80.5 |
| 235 | 96.6 | 63.6 | 88.4 | 82.7 | 88.0 | | | 90.9 | 66.0 |
| 236 | 73.1 | 35.0 | 52.6 | 45.5 | 130.2 | | | 43.8 | 29.9 |
| 237 | 197.1 | 47.1 | 65.5 | 54.2 | 58.3 | | | 59.8 | 39.5 |
| 238 | 87.5 | 41.7 | 58.0 | 40.6 | 39.7 | | | 44.8 | 29.5 |

## NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

SITE#832

| DAY | PRMP | TEAP | CHRP | CHRC | CHESSC | TGSC | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| 239 | 89.0 | 46.5 | 66.6 | 53.2 | 50.8 | | | 66.1 | 60.4 |
| 240 | | | 80.9 | 20.8 | 60.5 | | | 69.6 | 67.1 |
| 241 | 166.6 | 91.2 | 117.8 | 110.[illegible] | 97.1 | | | 119.2 | 89.1 |
| 242 | 177.4 | 77.8 | 110.0 | 90.[illegible] | | | | 86.4 | |
| 243 | 60.8 | 32.7 | 50.6 | [illegible] | 39.[illegible] | | | 36.9 | |
| 244 | | | 72.5 | | 73.5 | | | 57.5 | |
| 245 | 104.8 | 54.6 | 89.9 | [illegible] | 69.7 | | | | |
| 246 | 98.1 | 64.0 | | [illegible] | 63.9 | | | | |
| 247 | | 32.5 | 84.8 | 73 | [illegible] | | | 53.0 | 61.5 |
| 248 | 93.3 | 42.5 | 69.4 | 66.4 | | | | 54.5 | 60.7 |
| 249 | 64.9 | 39.0 | 71.1 | 56.2 | | | | 42.8 | 51.2 |
| 250 | 77.6 | 39.0 | 78.5 | 74.5 | | | | 49.4 | 60.5 |
| 251 | | 51.8 | 86.0 | 94.0 | 49.5 | | | 56.3 | 70.6 |
| 252 | 113.9 | 55.2 | 97.3 | 84.1 | 39.6 | | | 59.9 | 68.0 |
| 253 | 63.1 | | 96.8 | | | | | 59.0 | 71.5 |
| 254 | | 25.1 | 44.0 | | 37.6 | | | 42.6 | |
| 255 | 62.9 | 38.7 | 50.7 | 48.5 | 60.8 | | | 58.9 | |
| 256 | 66.9 | 42.3 | 57.8 | 45.8 | 51.9 | | | 60.2 | 70.1 |
| 257 | 75.2 | 48.5 | 50.7 | 50.1 | 35.3 | | | 59.0 | |
| 258 | 170.2 | | 90.9 | 81.5 | 74.8 | | | 89.7 | 89.2 |
| 259 | 112.5 | 83.7 | 104.0 | 99.8 | 98.0 | | | 10.4 | 105.3 |
| 260 | 222.3 | 68.8 | 83.9 | 72.7 | 82.6 | | | 82.0 | |
| 261 | | 44.5 | 50.6 | | 57.8 | | | 56.5 | |
| 262 | 89.6 | | | 66.0 | 88.6 | | | 76.7 | |
| 263 | 103.6 | 34.8 | 41.5 | 43.9 | 40.2 | | | 39.2 | |
| 264 | | 37.1 | 43.1 | 47.9 | 56.2 | | | 50.3 | |
| 265 | 96.4 | 33.9 | 39.3 | 40.9 | 36.7 | | | | |
| 266 | 100.3 | 49.9 | 61.8 | 53.4 | 49.0 | | | 59.6 | |
| 267 | 95.7 | 60.2 | 76.8 | | 44.5 | | | 121.5 | |
| 268 | 87.5 | 55.7 | 73.9 | 77.2 | 93.7 | | | | |
| 269 | 61.3 | 33.7 | 65.5 | 51.3 | 33.0 | | | 43.8 | |
| 270 | 85.5 | | 71.5 | 57.6 | 58.7 | | | 55.3 | |
| 271 | 63.3 | 35.3 | 58.8 | 59.8 | 28.1 | | | 47.2 | |
| 272 | 116.2 | 66.4 | 88.8 | 103.2 | 82.9 | | | | |
| 273 | 99.9 | | 75.2 | 66.1 | | | | 70.0 | |
| 274 | | 43.2 | 96.6 | | | | | | |
| 275 | 166.7 | 25.8 | 45.6 | 45.3 | 42.9 | | | 60.6 | |
| 276 | 109.1 | 39.7 | 50.6 | 51.1 | 42.8 | | | | |
| 277 | 93.2 | 58.1 | 63.5 | 56.0 | 63.1 | | | | |
| 278 | 117.1 | | 58.4 | | 59.4 | | | | |
| 279 | 83.7 | 55.9 | 57.4 | 61.1 | 41.1 | | | | |
| 280 | 102.7 | 65.2 | 62.0 | 68.6 | 84.3 | | | | |
| 281 | 139.4 | | | | 29.8 | | | 38.9 | |
| 282 | 143.1 | 69.3 | 74.9 | | 59.7 | | | 95.9 | 120.1 |
| 283 | 183.1 | | 102.5 | | 76.1 | | | 119.8 | 167.8 |
| 284 | 192.4 | 124.4 | 128.0 | 119.1 | 116.9 | | | 157.8 | 219.6 |
| 285 | 126.3 | | 76.9 | 65.3 | 66.9 | | | 92.6 | 129.8 |
| 286 | 111.0 | 73.2 | 66.2 | 61.6 | 68.6 | | | | |
| 287 | 94.6 | 34.4 | | | 35.3 | | | | |
| 288 | | | | | 50.3 | | | | |
| 289 | | | | | 25.5 | | | | |
| 290 | | | | | 50.0 | | | | |
| 291 | | | | | 86.1 | | | | |

```
              NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

  *************************************** SITE=001      ***************************************
  DAY    PRMF     TEAF     CHRP     CHMC    CHESSC    TGSC     TECH     TECA     CHEM
   2                                                                               68.3
   3                                                                               88.1
   4                                                                               94.3
   5                                                                               70.5
   6                                                                               88.1
   7                                                                               88.4
   8                                                                               84.2
   9                                                                               40.9
  10                                                                               40.2
  11                                                                               42.6
  12                                                                               71.0
  13                                                                               76.3
  14                                                                               65.6
  15                                                                               35.8
  16                                                                               25.2
  17                                                                               22.3
  18                                                                               29.5
  20                                                                      74.4     74.2
  21                                                                      75.2     78.9
  22                                                                       2.5     85.7
  23                                                                      95.6    122.0
  24                                                                      95.0    122.0
  25                                                                     134.7    193.1
  26                                                 82.9
  27                                                 38.1                 110.4    191.7
  28                                                 41.1
  29   100.8     33.1                                66.8                  88.7    114.6
  30    92.5     49.5     74.0     72.7              77.6                 106.2    125.0
  31    75.0     35.7     90.0     51.6              82.2                  90.5    107.6
  32   107.5     42.4     80.0     90.1                                   145.2    156.3
  33    99.4     31.0     81.1     91.6             105.0                 137.1    111.0
  34    53.3     79.1     33.0     33.9              13.6                  76.7     80.0
  35    78.8     51.7     72.1     94.0              60.1                  99.1     71.9
  36   135.0     91.3    115.2     88.9                                   156.9     88.3
  37    96.8      3.5              90.5              19.7                 152.3     83.6
  38    90.1     55.8     67.9     68.0              16.6                  67.6     60.2
  39   129.5     63.0     86.0     78.8                                   101.6     61.6
  40   103.4     63.6     70.0     70.2              75.7                 105.7     63.6
  41   110.7     53.6     29.2     99.6              81.2
  42   133.0     83.2     94.5     78.8              91.6
  43    52.6     48.8     61.1     55.8              15.3
  44    78.9     52.2     50.0     51.1              64.2
  45    71.0     51.0     52.2     52.6
  46    52.5     32.2     56.9     85.2              97.0
  47    70.5     70.8     62.0     66.9                                   255.9     92.5
  48             59.2     69.5                       56.1                  87.3     71.0
  49     9.7     58.8     50.1     67.6              65.9
  50    48.0     40.1     47.4     92.0              80.3
  51                      52.8     45.3              91.3
  52    59.2     53.9     60.9     66.0              83.0
  53    37.9     61.9              53.1              83.4
  54                                                 71.9                 300.9     95.5
  55                                                 68.0                  59.0     96.0
```

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                 NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

 ******************************************* SITE#001      ******************************************

  DAY     PRMF     TEAF     CHMF     CHRC     CHLSSC     TOSC    TECP     TECA     CHEM

   56                       48.2               54.4                         88.3     94.2
   57     75.0     53.5     72.8     65.3      88.7
   58    100.5     54.1              83.5      98.0                        103.2     98.9
   59    131.7     82.1              95.6   [illegible]
   60     72.3     60.6     64.6            [illegible]                     88.9     76.2
   61              35.6     61.3               41.6                         65.9     61.4
   62              68.6     78.6  [illegible]  59.6                         95.1     80.1
   63    111.1     58.8     69.5  [illegible]  59.8                         77.8     75.7
   64     91.8     74.7     71.1  [illegible]  87.4                        100.8     87.6
   65     74.0     55.1     64.2            [illegible]                     96.6     81.2
   66     82.9     25.5     60.4     50.0   [illegible]                     93.2     76.7
   67     49.7     39.9     42.6     37.1      36.6                         88.9     65.9
   68     44.5     41.4              28.6      49.3                         58.1     60.5
   69     63.5              48.4     50.0      62.8                         48.0     65.6
   70     98.2     57.1     63.2     58.9      44.4                        132.5     80.5
   71     81.0     60.0     58.9     65.4     137.9                        105.3     77.8
   72     69.6              65.5     57.6      92.7                        108.9     75.4
   73     50.7     38.5     43.3     44.7      52.6                         85.3     87.9
   74     47.3              47.4     47.6      45.0                         85.1     71.0
   75     87.4     61.9     72.8     70.7      68.1                        110.6    102.4
   76     94.9              80.0     78.0      87.7
   77    134.2    116.3    118.6    117.5     124.9                                  170.2
   78     98.8     78.0    126.9    112.8     101.7
   79     39.1     67.5     83.8     89.4      82.3                        223.3    210.3
   P      78.9     67.0     77.2     78.0      90.6                        179.6    174.7
   81     55.0     48.4     54.8     59.1      50.8                        129.3    118.4
   82     58.9                                 14.7
   83     80.2     66.6     75.4     76.9      19.9
   84     62.8                                           51.8
   85    142.5     83.9     96.9     97.8                84.7
   86     43.9     29.5     46.4     34.6      50.2      35.0
   87                                43.4      65.8      37.5
   88     70.0     45.4     61.8     61.9                50.9
   89    112.4     72.3     84.2     77.8      37.9      70.0
   90    131.8     70.3     88.0     73.9     159.7      75.4
   91    104.5     76.6     88.0     81.5                70.3             137.9    142.5
   92    167.3             120.0    110.8               108.4             205.0
   93                                          80.1     129.8             157.8    179.0
   94     74.8     36.5     41.9     44.0                71.4              80.7     75.6
   95                                55.2      46.7      70.4              93.4     76.9
   96                                75.9      47.2
   97     70.5     50.9     57.9     59.8      63.7      98.1
   98                                           5.7      47.8
   99     47.7     26.4     40.8     43.1                59.4
  100     82.7     44.2     74.6     56.1      70.6      83.5             109.5     89.2
  101     88.8              61.8     51.1     118.6      90.5             115.8    102.4
  102     67.6     38.3     56.4     52.9      77.4      74.4
  103     80.7     47.5     56.1               63.9      69.3              88.6     91.7
  104     90.7              74.7     60.4      58.2      76.0              97.5    111.1
  105    153.5     71.9     88.9     75.1      84.6      99.2
  106    110.6     63.5     68.7     56.1      54.2      57.3             108.6     98.6
  107     56.0     39.4     48.1     38.8      45.0      36.2              82.5     48.2
  108     26.6     42.5     48.7     44.6      86.7      40.8
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NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

---------------------------------------- SITE=841 ----------------------------------------

| DAY | FRMF | TEAF | CHRF | CHRC | CHESBC | TGSC | TECH | TECN | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| 109 | 132.7 | 59.0 | 60.1 | 79.3 | 100.0 | 71.4 | | 127.0 | 130.8 |
| 110 | 117.3 | 79.3 | 110.4 | 102.[illegible] | 8[illegible] | | | 159.0 | 175.6 |
| 111 | 60.7 | 32.9 | 44.2 | 33.[illegible] | 26.2 | 30.4 | | | |
| 112 | | | | | 31.2 | | | 33.1 | 96.9 |
| 113 | | | | | 75.1 | | | | |
| 114 | 134.0 | 5.8 | 69.8 | 6[illegible] | 93.9 | 83.5 | | | |
| 115 | 117.9 | 53.2 | 20.7 | 81.5 | 10[illegible] | 72.0 | | | 185.1 |
| 116 | 168.1 | 122.4 | 129.8 | 156.7 | | 157.9 | | | 0.4 |
| 117 | 164.1 | 98.7 | | 100.5 | 77.7 | 103.5 | | | |
| 118 | 112.6 | 77.9 | 85.9 | 100.8 | 66.7 | 30.7 | | | |
| 119 | 7.1 | 76.3 | | 87.9 | 59.4 | | | | |
| 120 | | | | | 61.2 | | | | |
| 121 | 101.4 | 55.7 | 63.5 | 69.4 | | 40.7 | | | |
| 122 | 29.0 | 18.0 | 15.6 | 15.4 | 36.6 | 10.9 | | | |
| 123 | 42.3 | 5.6 | 26.9 | 26.2 | 39.9 | 21.2 | | | |
| 124 | | 62.8 | 65.6 | 72.8 | 52.9 | | | | |
| 125 | 153.5 | 88.5 | 100.5 | 97.9 | 134.8 | 90.8 | | 150.7 | 154.8 |
| 126 | 9.7 | 101.0 | 2.7 | 2.5 | 101.1 | 4.4 | | | |
| 127 | | | | | 106.1 | | | | |
| 128 | | | | | 117.8 | | | | |
| 130 | | | | | 198.0 | | | | |
| 132 | | | | | 59.9 | | | | |
| 133 | | | | | 16.7 | | | | |
| 134 | 66.4 | 53.9 | 36.4 | 41.5 | | 27.4 | | 51.8 | |
| 135 | 33.4 | | 33.4 | 9.8 | 47.2 | | | 40.6 | |
| 136 | 39.4 | 20.2 | 2.5 | 28.0 | 56.6 | 20.0 | | 56.0 | |
| 137 | 64.0 | 15.3 | 40.8 | 44.7 | 104.8 | 25.1 | | 62.2 | |
| 138 | 76.0 | 25.7 | 36.1 | 31.4 | | 23.8 | | | |
| 139 | 37.2 | 26.0 | 21.5 | 26.4 | 62.3 | 22.5 | | | |
| 140 | 36.9 | 23.1 | 29.4 | 9.5 | 47.2 | 14.5 | | | |
| 141 | 38.7 | 21.3 | 23.1 | | 41.5 | 18.8 | | | |
| 142 | 29.9 | 57.0 | 63.5 | 2.5 | 38.9 | 56.1 | | | |
| 143 | | 44.4 | 53.3 | 50.9 | 69.0 | 41.5 | | | |
| 144 | 65.5 | 35.2 | 40.0 | 36.0 | 67.0 | 29.7 | | | |
| 145 | 308.9 | | | 40.8 | 72.4 | | | 67.9 | |
| 146 | | 26.8 | | 27.8 | 33.5 | | | 40.5 | 82.0 |
| 147 | 65.4 | | 44.9 | 44.6 | | 38.1 | | 69.0 | 138.5 |
| 148 | 68.8 | 34.0 | 47.9 | 35.9 | 65.7 | | | 54.8 | |
| 149 | 56.9 | 6.0 | 42.8 | 2.6 | 62.0 | 34.2 | | 56.1 | |
| 150 | 124.4 | 58.4 | | 67.3 | | 60.7 | | 101.0 | |
| 151 | 151.4 | 54.9 | 69.6 | 58.6 | 120.3 | 51.2 | | 79.9 | 193.3 |
| 152 | 109.8 | | | 66.8 | 86.0 | 68.9 | | | |
| 153 | 48.5 | 25.5 | 32.5 | 23.3 | 44.9 | 18.5 | | | |
| 154 | 57.6 | 30.6 | 39.4 | 20.5 | 50.8 | 31.1 | | | |
| 155 | 13.6 | 57.3 | 42.5 | 9.1 | 60.4 | 49.6 | | | |
| 156 | | | 79.1 | | | 67.9 | | | |
| 157 | 56.4 | 36.9 | 52.0 | 50.9 | 71.7 | 35.2 | | | |
| 158 | 40.8 | | 37.5 | 31.8 | 54.9 | 21.6 | | 40.1 | 96.5 |
| 159 | 31.6 | 42.5 | 50.9 | 12.7 | 91.0 | 37.6 | | 84.7 | 108.9 |
| 160 | 7.3 | 1.3 | 0.6 | | | 1.2 | | | 101.4 |
| 161 | 43.4 | 9.3 | 38.6 | 39.1 | 59.2 | 31.6 | | | |
| 162 | 108.5 | 54.7 | 32.7 | | | 18.6 | | 46.5 | 31.7 |
| 163 | 93.4 | 43.1 | 24.8 | | 29.3 | 19.9 | | 65.7 | |

```
                   NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

---------------------------------------- SITE#001   ----------------------------------------

DAY     PRMP     TEAF     CHMP     CHMC   CHMSSC     TGSC     TECH     TEC4     CHEM

165    107.0     17.0      9.3     26.2
166     58.6     32.7     11.1     31.1                 *              104.2
167    134.6              48.6     57.9     99.0                         80.9
168     85.2     51.3     34.8     51.6       9.     37.5               68.3
169     83.4     41.1     58.9      56.     69.0     34.5               71.0
170     88.8              62.0      51.              49.8               67.1
171     15.0               5.8      17.     53.3      1.2               67.9
172    153.5     98.2     98.5      81.    120.3     92.7
173    141.2     90.6     93.9              124.     64.5              166.9
174     12.9      7.6      5.1     15.1               1.3                8.3
175     89.5     60.0     58.2     56.5                                115.3
176    136.2              71.3     68.1     94.2                         89.7
177                                                                     85.1
178                                                                     22.0
179     90.3              28.4     24.2     70.9     18.9
180     92.2     27.6     35.2     37.4     98.2     24.3               68.4     83.5
181                       51.9              90.3     54.9
182     38.0                                45.3
183     63.0     36.6     40.0     84.6              29.8
185                                         34.4
186     31.4     18.6     71.6     59.6     21.4     18.8                        45.0
187     77.0              60.7     69.9     53.8     40.4                        99.6
188     59.1     25.8              55.9     64.1     20.5                        73.2
189     59.9     20.1     29.9     77.6     18.1     23.9
190     50.4              27.5     40.0     69.8     23.9
191    106.6     47.3     65.9     65.2    129.5     53.4
192     89.0     65.1     43.8     54.2     87.8     41.9
193     58.5     28.8     36.9     41.8     53.9
194     75.9     30.6     36.7     52.8     60.3     25.6                        97.0
195     43.0     23.7     48.1     53.2     61.1     28.9
196     88.3     45.9     66.8     53.1     70.0     41.7
197     80.5     34.9     57.1              70.6     41.6                        92.6
198     54.3     24.0     38.4     34.9     91.4     24.6                        98.1
199                                        113.6                       141.4    192.4
200    126.8     50.3     97.6             109.0     60.6
201     74.6     16.3     26.6     27.6     57.0     18.6
202    115.1     56.7     68.5     62.9              42.3
203     45.2     22.9     31.2     34.9     26.8     23.8
204     30.4     17.9     16.1              21.8      8.7               28.8     36.6
205     82.7     44.4     58.6             111.8     42.3               53.3     44.3
206              31.8              67.2     45.9     36.5
207     29.9     20.4     26.9     25.4     25.6     16.6
208     75.9     40.2     57.3     49.9     65.9                        71.4
209    100.5     60.4     71.8     75.6              52.4
210     63.5     39.2     43.2     52.9     46.9     31.8
211     87.0     36.3              41.9     52.1     33.5
212     50.8     34.1     48.6     43.3     30.2     38.5
213     55.1     25.5     46.7     28.8     34.0     26.1
214    105.9     43.0     72.5     58.9     45.3     51.2
215     63.1     36.7                       58.6     46.0
216     73.1     39.2     65.8     61.1     60.1     45.3
217     64.0              41.9                       36.0
218     64.3              30.8     33.3     41.8                                 70.6
```

NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

SITE=841

| DAY | FRMP | TEAF | CHMP | CHRC | CHESSC | TGSC | TECH | TECU | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| 219 | 28.4 | 16.9 | 23.2 | 22.7 | 28.4 | | | | |
| 220 | | | | 26.8 | 30 | | | | |
| 221 | 93.7 | 10.2 | 40.1 | 43.[illegible] | 47.6 | | | | 76.1 |
| 222 | 38.1 | 24.0 | 25.1 | 26.4 | | | | | 45.3 |
| 223 | 58.0 | 29.0 | 33.9 | 35.[illegible] | | | | | |
| 224 | | | 40.0 | 65.[illegible] | | | | | |
| 225 | 95.3 | 45.7 | 74.4 | 78.0 | 58.4 | | | 97.1 | 113.8 |
| 226 | 36.0 | 17.7 | 34.9 | | | | | 56.9 | 45.4 |
| 227 | 36.7 | 24.0 | 49.2 | 40.8 | | | | 79.9 | 64.2 |
| 228 | 44.1 | 16.5 | 38.0 | 47.4 | | | | 37.9 | 61.6 |
| 229 | 56.7 | 44.5 | 55.1 | 55.9 | | | | 61.2 | 56.8 |
| 230 | | 43.0 | 76.2 | 61.4 | | | | 41.9 | 63.9 |
| 232 | 56.5 | 32.2 | 43.6 | | | | | | |
| 233 | | | 55.9 | | 58.0 | | | | |
| 234 | 115.6 | 48.0 | 67.2 | 54.1 | | | | | |
| 235 | 40.3 | 29.8 | 42.7 | 42.6 | | | | | |
| 236 | 13.4 | | 12.0 | | | | | | |
| 237 | 52.4 | 30.7 | 44.7 | 33.6 | 51.6 | | | | 51.5 |
| 238 | 68.9 | 38.7 | 47.4 | 45.6 | 43.3 | | | | |
| 239 | | 56.0 | | | | | | | 123.6 |
| 240 | 74.5 | | 69.1 | | | | | | |
| 241 | 87.8 | 69.4 | 107.9 | 96.5 | | | | | |
| 242 | 156.1 | 87.9 | 141.8 | 105.1 | 151.7 | | | | |
| 243 | 64.2 | 26.6 | 60.4 | 44.4 | 43.3 | | | | |
| 244 | 82.4 | 41.4 | 54.6 | 55.9 | 86.4 | | | | |
| 245 | 84.9 | 62.4 | 79.9 | 69.8 | 96.1 | | | | |
| 246 | 107.3 | 44.4 | 102.1 | 113.4 | 109.4 | | | | 89.3 |
| 247 | 105.0 | 52.8 | 94.9 | 89.6 | 78.2 | | | | |
| 248 | | 33.4 | 67.4 | | 29.8 | | | | |
| 249 | 55.2 | 29.1 | 69.1 | 64.8 | 36.5 | | | | |
| 250 | 103.2 | 30.7 | 80.6 | 64.5 | | | | | |
| 251 | 77.0 | 38.8 | 111.1 | 83.4 | 48.7 | | | | |
| 252 | 66.4 | 39.1 | 42.5 | 40.5 | 21.8 | | | | |
| 253 | 94.1 | 65.4 | | 61.9 | 61.0 | | | | |
| 254 | 44.3 | | 36.5 | 32.7 | 43.5 | | | | |
| 255 | 27.2 | 19.4 | 25.3 | 23.9 | 22.6 | | | | |
| 256 | 72.2 | 41.2 | 57.1 | 59.8 | | | | 69.4 | 102.4 |
| 257 | | 10.7 | 15.9 | | 30.4 | | | | |
| 258 | 39.7 | 28.2 | 41.6 | 36.9 | 39.7 | | | | |
| 259 | | | 61.2 | | | | | | |
| 260 | | 81.0 | 98.9 | 76.4 | 105.4 | | | | 188.4 |
| 261 | 91.3 | 33.2 | 44.4 | 43.2 | 48.8 | | | | |
| 262 | 101.6 | 43.4 | 57.1 | 55.6 | 87.8 | | | | 97.1 |
| 263 | 82.3 | 32.0 | 48.7 | 48.4 | 37.7 | | | | 90.2 |
| 264 | 56.4 | 32.9 | 44.5 | 44.6 | 50.5 | | | 86.6 | 66.8 |
| 265 | 86.3 | 34.8 | 48.8 | 47.4 | 48.3 | | | 63.0 | 84.2 |
| 266 | 59.0 | | 37.1 | 39.3 | 44.4 | | | | 88.5 |
| 267 | | | | 77.3 | | | | 97.2 | 150.0 |
| 268 | 74.8 | 51.4 | 83.4 | 72.5 | | | | 77.9 | 136.5 |
| 269 | 101.9 | 43.3 | 80.0 | | | | | 72.9 | 111.2 |
| 270 | 69.9 | 38.6 | 72.7 | 66.7 | | | | 56.9 | 83.4 |
| 271 | 89.8 | 41.3 | 70.5 | 61.2 | | | | | |
| 272 | | 20.4 | 45.5 | 44.0 | 57.7 | | | | |

NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

---------------------------------------- SITE=001 ----------------------------------------

| DAY | FRMP | TEAP | CHRP | CHRO | CHEBSC | TGSC | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| 273 | 80.5 | 44.5 | 71.1 | 66.2 | 75.7 | | | 67.5 | 95.9 |
| 274 | 122.2 | 62.9 | 93.8 | 87.2 | | | | | |
| 275 | 94.0 | | 4.1 | 64.7 | | | | | |
| 276 | 32.4 | | 20.4 | 16.1 | 2[illegible] | | | | |
| 277 | 33.7 | 14.5 | 18.6 | 16[illegible] | 34.3 | | | | 35.5 |
| 278 | 23.3 | 2.7 | 3.1 | 8[illegible] | 18.0 | | | | 5.0 |
| 279 | 27.8 | 17.0 | 25.9 | 21[illegible] | 43.0 | | | | |
| 280 | 89.7 | | 52.2 | 41[illegible] | 40.0 | | | | |
| 281 | 117.6 | 71.1 | 78.0 | 65.[illegible] | 75[illegible] | | | | |
| 282 | 127.8 | | 72.4 | | 18.[illegible] | | | | |
| 283 | | 49.4 | 45.6 | 48.4 | 20.[illegible] | | | | |
| 284 | 151.9 | | | 104.4 | 20.0 | | | 152.0 | |
| 285 | | | 107.8 | 105.8 | 112.5 | | | 148.8 | |
| 286 | 140.5 | 129.7 | 43.3 | 119.9 | 104.7 | | | | |
| 287 | | | | | 68.9 | | | | |
| 288 | | | | | 61.5 | | | | |
| 289 | | | | | 40.6 | | | | |
| 290 | | | | | 55.9 | | | | |
| 291 | | | | | 45.2 | | | | |

NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

---------------------------------------- SITE#032 DLP ----------------------------------------

| DAY | PRMP | TEAP | CHMP | CHMC | CHESSC | TGSC | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| 99 | 81.4 | 44.2 | 50.8 | 51.4 | [illegible] | 78.0 | | | |
| 100 | 47.3 | 35.4 | 40.0 | | | 62.4 | | | |
| 101 | 79.0 | 39.6 | 49.5 | 46. | 46.0 | | | | |
| 102 | 82.4 | 42.2 | 46.4 | 62. | 63.0 | 62.4 | | | |
| 103 | 101.6 | 55.5 | 60.8 | 63. | 71.0 | 77.9 | | | |
| 104 | | 51.7 | 57.6 | | 61.7 | 79.8 | | | |
| 105 | 128.8 | 68.5 | 80.8 | 73.4 | 92. | 96.4 | | | |
| 106 | 87.5 | 48.9 | 61.9 | 44.1 | [illegible] | 47.7 | | | |
| 107 | 96.6 | 22.5 | 54.4 | 35.1 | 58.2 | 41.1 | | | |
| 108 | | 51.4 | 56.5 | 50.5 | 72.8 | 46.1 | | | |
| 109 | 138.3 | 83.6 | 86.7 | 88.1 | | 85.2 | | | |
| 110 | 153.8 | 76.1 | 97.4 | 99.2 | 129.9 | 89.5 | | | |
| 111 | 109.4 | 55.8 | 68.9 | 50.5 | 52.8 | 51.2 | | | |
| 112 | | | | | 16.7 | | | | |
| 113 | 96.8 | 50.5 | 56.1 | 65.1 | 179.1 | 54.4 | | | |
| 114 | 258.9 | | | | 48.8 | 64.6 | | | |
| 115 | 157.7 | 60.4 | 61.3 | 78.1 | 97.4 | 55.5 | | | |
| 116 | 183.6 | 62.7 | 60.0 | 66.0 | 75.2 | 66.6 | | | |
| 117 | 130.9 | 67.9 | 98.6 | 102.5 | 59.7 | | | | |
| 118 | 111.8 | 63.9 | 101.5 | 84.8 | 80.4 | 81.3 | | | |
| 119 | 150.4 | 82.8 | 90.2 | 105.5 | 300.4 | 89.9 | | | |
| 120 | 123.2 | 68.6 | 74.1 | 68.5 | 102.6 | 59.4 | | | |
| 121 | 126.6 | 67.3 | 80.0 | 87.9 | 82.1 | 70.2 | | | |
| 122 | 105.1 | 40.7 | | 51.3 | 66.8 | | | | |
| 123 | | 58.9 | | 69.4 | 99.2 | | | | |
| 124 | 124.7 | 70.2 | 79.9 | 72.9 | 176.5 | | | | |
| 125 | 112.7 | 74.1 | 77.1 | 86.9 | 93.3 | 58.0 | | | |
| 126 | | 134.6 | 137.6 | 138.2 | 154.0 | 109.6 | | | |
| 127 | | | | | 144.1 | | | | |
| 131 | | | | | 71.3 | | | | |
| 132 | | | | | 78.7 | | | | |
| 133 | | | | | 132.7 | | | | |
| 134 | | 33.9 | | 47.2 | 93.2 | | | | |
| 135 | | 38.2 | | 33.6 | 67.7 | 23.5 | | | |
| 136 | 80.5 | 55.0 | 55.9 | 45.3 | 88.6 | 32.1 | | | |
| 137 | | 28.3 | | | 75.2 | 27.4 | | | |
| 138 | | 51.1 | 62.1 | 50.4 | | 37.1 | | | |
| 139 | | | | | 55.2 | | | | |
| 140 | 84.5 | 48.5 | 54.8 | 42.1 | 87.5 | 36.2 | | | |
| 141 | | 69.5 | 72.1 | 67.6 | 109.3 | 53.0 | | | |
| 142 | | | | | 115.9 | 16.8 | | | |
| 143 | 122.1 | 2.5 | 86.4 | 73.4 | 75.8 | 64.3 | | | |
| 144 | 136.6 | | 101.1 | 96.1 | * | 71.9 | | | |
| 145 | 154.8 | 102.4 | 398.8 | | | | | | |
| 146 | 82.9 | 45.6 | 42.6 | | | | | | |
| 147 | 96.5 | 71.3 | 63.1 | 69.1 | | | | | |
| 148 | 130.8 | 79.3 | 92.5 | | 153.4 | 69.4 | | | |
| 149 | | 149.0 | 167.5 | | 197.3 | | | | |
| 150 | 193.9 | | 147.1 | | 199.1 | 129.9 | | | |
| 151 | 222.8 | 163.9 | | 176.2 | | 153.7 | | | |
| 153 | 112.5 | 35.0 | 52.2 | 46.4 | 88.8 | 38.6 | | | |
| 154 | | | 201.4 | | 171.6 | | | | |
| 155 | 185.9 | 197.0 | 263.1 | 197.6 | 204.1 | 163.5 | | | |

NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

**************************************** SITE=832 DLP ****************************************

| DAY | FRMF | TEAF | CHRF | CHRC | CHESSC | TOSC | TECH | TECA | CHFM |
|---|---|---|---|---|---|---|---|---|---|
| 156 | 75.1 | 60.6 | 66.9 |  | 106.3 | 41.5 |  |  |  |
| 157 | 76.2 | 53.2 | 66.6 | 60.8 | 102.4 | 43.8 |  |  |  |
| 158 | 67.9 | 47.4 | 60.0 | 52.6 | 62.7 | 37.9 |  |  |  |
| 159 | 88.6 | 69.7 | 81.9 | 67.6 | 98.9 | 52.7 |  |  |  |
| 160 |  |  |  |  | 96. |  |  |  |  |
| 161 | 56.7 | 45.8 | 50.7 | 48.1 |  | 34.8 |  |  |  |
| 162 | 108.8 | 65.7 | 45.5 | 55.3 |  | 37.9 |  | 77.4 | 83.3 |
| 163 | 100.1 |  | 44.9 | 48.8 | 67.2 |  |  | 84.9 | 94.6 |
| 164 | 135.6 |  | 37.9 |  | * | 37.1 |  |  |  |
| 165 | 192.0 | 77.8 | 54.0 | 61.1 | 65.0 |  |  | 92.2 | 96.7 |
| 166 | 147.4 |  | 78.2 | 80.4 | [illegible] | 10.0 |  | 108.9 | 117.8 |
| 167 | 200.8 | 98.4 | 68.8 |  | 45.9 | 64.2 |  |  |  |
| 168 |  | 107.2 | 69.8 | 72.7 | 100.8 | 82.6 |  |  |  |
| 169 | 162.8 | 136.6 | 136.0 | 104.8 | 87.7 | 94.9 |  |  |  |
| 170 | 173.3 | 107.6 | 104.7 | 103.4 | 152.5 | 73.4 |  |  |  |
| 171 | 139.3 | 132.2 |  | 117.3 | 114.3 | 98.6 |  |  |  |
| 172 | 189.6 | 126.8 | 149.2 |  | 136.8 | 89.7 |  | 264.1 | 285.3 |
| 173 | 153.6 | 128.6 | 171.1 | 100.9 | 131.3 | 113.7 |  | 201.6 | 227.1 |
| 174 | 228.3 | 113.5 | 114.4 | 112.4 | 195.0 | 83.5 |  |  |  |
| 175 | 243.2 |  | 181.8 |  |  | 108.0 |  |  |  |
| 176 |  |  | 62.0 |  | 50.0 |  |  | 93.0 | 97.6 |
| 177 | 213.1 | 116.5 | 123.8 | 137.0 |  |  |  | 104.5 | 207.1 |
| 178 | 20.3 | 3.6 | 5.9 |  | 328.3 |  |  |  |  |
| 179 | 36.4 | 24.7 | 27.9 | 22.6 | 79.0 | 21.4 |  |  |  |
| 180 |  | 99.1 |  | 92.4 | 212.9 |  |  | 148.3 | 161.8 |
| 181 | 90.9 |  | 95.5 | 74.1 | 117.6 | 54.9 |  | 128.7 | 133.9 |
| 183 | 94.1 | 56.2 | 65.5 | 86.8 | 176.5 | 43.6 |  | 111.7 | 118.4 |
| 184 | 110.6 | 81.0 | 115.6 | 83.9 | 164.0 | 60.7 |  | 123.6 | 129.1 |
| 185 |  | 33.3 | 37.5 | 57.6 | 18.5 | 19.4 |  |  | 67.5 |
| 186 | 61.9 | 48.1 | 64.1 | 48.2 | 98.0 | 58.7 |  |  |  |
| 188 | 87.8 | 39.1 | 65.2 | 57.8 | 34.1 | 40.8 |  |  |  |
| 189 | 95.9 | 47.0 | 69.8 | 73.9 | 43.9 | 43.7 |  |  |  |
| 190 | 151.4 |  | 111.9 | 87.1 | 123.6 |  |  |  |  |
| 191 | 103.0 | 68.7 | 103.8 | 83.3 | 28.0 | 43.6 |  | 128.6 | 137.6 |
| 192 | 57.1 |  | 60.4 | 64.0 |  |  |  | 88.1 | 95.5 |
| 193 | 71.6 | 72.9 | 96.5 |  | 85.3 | 63.8 |  | 138.3 | 138.9 |
| 194 | 168.8 | 44.7 | 59.5 | 61.1 | 71.5 | 37.6 |  | 99.0 | 96.9 |
| 195 | 150.3 | 68.6 | 105.5 | 87.1 | 149.0 | 57.3 |  | 122.2 | 143.1 |
| 196 | 130.0 | 145.4 | 183.2 | 145.8 | 158.2 | 100.7 |  | 227.3 | 264.3 |
| 197 | 235.5 | 188.3 | 198.4 | 188.1 | 237.4 | 147.1 |  | 268.7 | 305.4 |
| 198 |  | 196.1 | 230.7 | 228.0 | * | 193.4 |  |  |  |
| 199 | 104.6 | 50.4 | 71.5 | 37.1 |  | 70.2 |  | 128.0 | 158.9 |
| 200 | 90.7 | 66.1 | 62.8 | 61.6 |  | 55.2 |  | 104.6 | 113.4 |
| 201 | 102.2 | 41.2 | 57.6 | 64.4 |  | 43.3 |  |  |  |
| 202 | 71.2 | 45.9 | 50.9 | 45.6 | 95.7 | 38.3 |  |  |  |
| 203 | 63.5 |  | 40.2 | 46.0 | 132.7 |  |  |  |  |
| 204 | 74.4 | 50.4 | 50.4 | 53.3 |  |  |  |  |  |
| 205 | 91.0 | 55.8 | 70.1 | 74.9 | 107.1 | 43.3 |  |  |  |
| 206 | 102.9 | 66.9 | 82.6 | 43.5 | 30.3 | 54.6 |  |  |  |
| 207 | 50.2 | 37.4 | 38.7 | 92.6 | 42.5 | 28.5 |  | 52.1 | 43.0 |
| 208 | 120.5 | 93.6 | 89.1 | 92.4 | 104.5 | 65.0 |  | 108.5 | 103.9 |
| 209 | 189.4 |  | 129.3 | 205.3 |  | 80.8 |  | 161.2 | 197.7 |
| 210 | 78.7 | 43.2 | 53.6 | 55.5 | 77.3 | 36.3 |  |  | 92.7 |

NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

---------------------------------------- SITE=832 DLP ----------------------------------------

| DAY | PRMP | TEAP | CHRF | CHRC | CHESSC | TGSC | TECH | TEC4 | CHEM |
|---|---|---|---|---|---|---|---|---|---|
| 211 | 97.7 | 64.5 | | 76.4 | 47.5 | | | | |
| 212 | 153.8 | 73.5 | | 90.8 | | 62.4 | | 103.9 | 86.1 |
| 213 | 84.1 | 52.4 | 94.7 | 60.1 | [illegible] | 50.9 | | 70.8 | 56.7 |
| 214 | 94.9 | | 86.4 | | [illegible] | 45.3 | | | 69.0 |
| 215 | 97.0 | 67.0 | | 88.0 | 85.4 | 49.3 | | | |
| 216 | 105.1 | 62.1 | 84.8 | 72.6 | 65.7 | 54.7 | | | |
| 217 | 169.7 | | 82.1 | 63.9 | 62.8 | 39.6 | | | |
| 218 | 95.2 | | 64.8 | | 82.2 | | | | |
| 219 | | 50.0 | 57.4 | 56.8 | [illegible] | | | | |
| 220 | 80.6 | | 57.3 | 62.1 | | | | | |
| 221 | 114.1 | 54.5 | 70.8 | 66.9 | 69.1 | | | 74.6 | 69.2 |
| 222 | 96.4 | 29.2 | | 37.9 | | | | 41.1 | 41.9 |
| 223 | 90.1 | | 51.3 | 53.9 | | | | | 49.3 |
| 224 | | | 74.0 | | 72.9 | | | | 57.5 |
| 225 | 103.3 | 47.1 | 74.7 | 80.0 | 100.9 | | | | 57.5 |
| 226 | 46.1 | 26.1 | 43.3 | 43.8 | 33.7 | | | | 28.7 |
| 227 | 138.1 | 40.0 | 57.8 | 59.8 | 49.6 | | | | 43.9 |
| 228 | 100.8 | 41.2 | 65.1 | 59.4 | | | | 35.8 | 40.6 |
| 229 | | 59.5 | 82.4 | 73.9 | 58.2 | | | | |
| 230 | 83.2 | 37.5 | 51.9 | 61.5 | 49.9 | | | 45.3 | 31.7 |
| 231 | 158.2 | 91.3 | 125.2 | 100.9 | | | | | |
| 232 | 53.1 | 122.3 | 119.6 | 98.4 | | | | | 80.6 |
| 233 | 137.4 | 97.6 | 116.8 | 112.6 | 78.7 | | | 103.2 | 70.0 |
| 234 | 133.3 | 87.4 | 109.2 | | 79.4 | | | | 75.0 |
| 235 | 99.4 | 84.3 | 99.2 | 89.2 | 8.8 | | | | 60.6 |
| 236 | 74.4 | 40.5 | 53.8 | 47.1 | 50.6 | | | | 33.5 |
| 237 | 139.0 | 55.6 | 70.7 | 51.8 | 60.1 | | | 56.0 | 46.1 |
| 238 | 71.4 | 47.4 | | 49.5 | 17.2 | | | 44.3 | 36.9 |
| 239 | 63.7 | 46.1 | 69.4 | 51.1 | 70.5 | | | 62.8 | |
| 240 | 79.9 | 65.1 | 86.6 | 86.6 | 73.4 | | | 66.6 | |
| 241 | 97.6 | | 121.3 | | 53.3 | | | 116.0 | |
| 242 | | | 104.2 | 90.0 | 90.7 | | | 84.0 | 55.0 |
| 243 | 150.6 | | 52.5 | 40.2 | 69.1 | | | 34.0 | 23.1 |
| 244 | 87.9 | 50.2 | 79.3 | 67.2 | 63.9 | | | 56.3 | 38.1 |
| 245 | | | 108.7 | 72.6 | 73.8 | | | 73.7 | 43.7 |
| 246 | | 67.3 | 107.5 | 81.5 | | | | 78.6 | |
| 247 | 127.8 | 30.0 | 104.7 | 81.5 | 85.7 | | | 50.9 | |
| 248 | | 48.2 | 72.8 | 81.3 | 56.8 | | | 50.5 | |
| 249 | 60.0 | 41.6 | 66.7 | 74.1 | 47.3 | | | 43.4 | |
| 250 | | 45.9 | 83.2 | 79.4 | | | | | |
| 251 | 73.1 | 42.6 | 87.2 | 85.9 | | | | 59.0 | |
| 252 | 81.3 | 47.4 | 80.4 | 68.6 | 50.8 | | | | |
| 253 | 56.6 | 43.8 | 59.3 | 49.2 | 37.0 | | | | |
| 254 | 37.9 | | 32.0 | 37.0 | | | | 42.3 | |
| 255 | 38.4 | | 54.4 | 51.9 | 60.1 | | | 58.3 | |
| 256 | 74.7 | 45.0 | 58.6 | 47.8 | 41.8 | | | 58.0 | 76.8 |
| 257 | 75.4 | 36.5 | 51.2 | 45.9 | | | | 50.4 | |
| 258 | 151.7 | | 95.2 | 74.5 | | | | 81.2 | 105.0 |
| 259 | 169.1 | 84.3 | 101.5 | 94.4 | 84.7 | | | 119.6 | 129.9 |
| 260 | 144.7 | 71.8 | 94.6 | 76.2 | 104.5 | | | 80.0 | 95.6 |
| 261 | | 47.1 | 68.0 | 53.8 | 49.0 | | | 53.6 | 67.4 |
| 262 | 107.0 | | 80.7 | | 85.0 | | | 72.5 | |
| 263 | 56.1 | 29.7 | 36.2 | | 36.0 | | | 35.9 | |

```
                    NO2 MONITORING METHODS COMPARISON -- DAILY DATA LISTING

****************************************** SITE#832 DLP ******************************************

DAY    FRPP     TEAF     CHRF     CHRC     CHESSC    TGSC     TECH     TEC4     CHEM

264                      45.2     47.3      45.9                        47.9
265    110.6    33.0     39.8     35.6      27.3
266    105.3    43.2     59.9     50.1      84.0                        56.0     88.1
267             61.8     71.2     73.5                                  63.5    106.0
268     90.7    50.4              72.        3                          60.7
269     41.6    23.8     56.9     48.       57.8                        39.1     57.0
270     84.1    41.0     62.5     59.       97.2                        49.0     73.7
271             29.6     64.9     49        33.2                        40.9     61.0
272    121.2    54.2     82.6     6         74.1
273             45.7     69.5     64.                                   61.3     86.6
274     64.8    35.9     46.7     46.7
275     53.3             47.4     38.1      64.1                        50.4     78.0
276     92.4    39.8     51.4     49.0
277     99.3    51.8     62.1     61.3      62.4
278     74.2             58.4               59.1
279     95.9    48.6              55.0      99.6
280    146.0    52.9     73.3     60.6      78.2
281                                         34.9                        36.0     53.0
282    118.9    71.0     68.0     71.9      52.9                        89.1    127.8
283                      97.2               81.4                       117.6    167.7
284    183.4            123.2    104.2     119.8                       150.8    222.9
285    107.3             71.9               65.6                        97.8    127.8
286    119.3    73.0     76.2     70.7      46.3
287             37.0     40.2               79.0
288                                         32.6
289                                         25.1
290                                        104.9
291                                         42.9
```